

3690





THE IRISH NATURALIST.

Hm 2

A Monthly Journal

OF

GENERAL IRISH NATURAL HISTORY,

ORGAN OF THE

*Royal Zoological Society of Ireland ; Dublin Microscopical Club ;
Belfast Natural History and Philosophical Society ;
Belfast Naturalists' Field Club ; Dublin Naturalists' Field Club ;
Cork Naturalists' Field Club ; Limerick Field Club ;
Ulster Fisheries and Biology Association.*

EDITED BY

GEORGE H. CARPENTER, B.Sc.LOND., M.R.I.A.

R. LLOYD PRAEGER, B.A., B.E., M.R.I.A.,

AND

ROBERT PATTERSON, F.Z.S., M.R.I.A.

VOL. XII.

DUBLIN: EASON & SON, LIMITED,
85 MIDDLE ABBEY STREET, AND 40 LOWER SACKVILLE STREET.
BELFAST: 17 DONEGALL STREET.
LONDON: SIMPKIN, MARSHALL HAMILTON, KENT & Co., LTD.

1903.

PRINTED BY ALEX. THOM & CO. (LIMITED), 87, 88, & 89, ABDEY-STREET, DUBLIN.

CONTRIBUTORS

TO THE PRESENT VOLUME.



- ADAMS, JOHN, B.A., Royal College of Science for Ireland.
BARRETT-HAMILTON, CAPT. G. E. H., B.A., F.Z.S., M.R.I.A., Kilma-
nock House, Arthurstown.
BARRINGTON, RICHARD M., LL.B., M.R.I.A., Fassaroe, Bray.
BELL, ROBERT, Newington Avenue, Belfast.
BENSON, REV. CHARLES W., LL.D., Balbriggan, Co. Dublin.
BOUSKELL, FRANK, F.L.S., Market Bosworth, Nuneaton.
BRUCE, W. BALFOUR, Bray.
BURBIDGE, F. W., M.A., F.L.S., M.R.I.A., Trinity College Botanic
Garden, Dublin.
CAMPBELL, D. C., Londonderry.
CARPENTER, G. H., B.Sc., M.R.I.A., National Museum, Dublin.
CARROTHERS, NATHANIEL, 4, Stranmillis Gardens, Belfast.
CHASTER, DR. G. W., Talbot Street, Southport.
COLE, PROF. G. A. J., F.G.S., M.R.I.A., Royal College of Science for
Ireland.
COLGAN, NATHANIEL, M.R.I.A., Sandycove, Co. Dublin.
CUTHBERT, H. K. GORE, Dublin.
DAVIES, J. H., Lenaderg, Banbridge, Co. Down.
DONISTHORPE, HORACE ST. J. K., F.Z.S., F.E.S., South Kensington,
London, S.W.
FLEMYNG, REV. W. W., M.A., Portlaw, Co. Waterford.
FOSTER, NEVIN H., Hillsborough, Co. Down.
GRIERSON, PHILIP HENRY, Irish Land Commission, Dublin.
GUNN, W. F., 61, Dawson Street, Dublin.
HART, W. F., Kilderry, Co. Donegal.
HARVIE-BROWN, J. A., F.R.S.E., Dunipace, Larbert, N.B.
JOHNSON, PROF. THOMAS, D.Sc., M.R.I.A., Royal College of Science
for Ireland.
JOHNSON, REV. W. F., M.A., F.E.S., Poyntzpass, Co. Armagh,
KANE, W. F. DE VISMES, M.A., M.R.I.A., D.L., Drumreask, Co.
Monaghan.
KAYE, W. J., F.E.S., Surbiton, Surrey.
KIDSTON, R., F.R.S., Stirling.
KNOWLES, MISS M. C., National Museum, Dublin.
KNOX, GODFREY, Foxford, Co. Mayo.
LEEBODY, PROF. J. R., D.Sc., Londonderry.
LETT, REV. CANON H. W., M.A., M.R.I.A., Loughbrickland,
Co. Down.
MACARDLE, DAVID, Royal Botanic Gardens, Glasnevin, Dublin.
MASON, J. E., Lincoln.
MASSY, MISS A. L., Malahide, Co. Dublin.
MOFFAT, C. B., B.A., Ballyhyland, Enniscorthy.

- MORICE, REV. F. D., M.A., Mount Hermon, Woking.
 MORLEY, CLAUDE, F.G.S., Ipswich.
 MOSS, R. J., F.I.C., Leinster House, Dublin.
 ORR, H. LAMONT, Garfield Street, Belfast.
 PACK-BERESFORD, DENIS, D.L., Fenagh House, Bagenalstown.
 PALMER, J. E., Ballybrack, Co. Dublin.
 PATTEN, PROF. C. J., M.D., University College, Sheffield.
 PATTERSON, R. M., Strandtown, Co. Down.
 PATTERSON, ROBERT, M.R.I.A., F.Z.S., Malone Park, Belfast.
 PETHYBRIDGE G. H., B.Sc., PH.D., Royal College of Science for
 Ireland.
 PHILLIPS, R. A., Ashburton, Cork.
 PICKARD-CAMBRIDGE, REV. O., M.A., F.R.S., Bloxworth, Dorset.
 PRAEGER, R. LLOYD, B.A., B.E., M.R.I.A., National Library of
 Ireland.
 SAUNDERS, EDWARD, F.L.S., Mount Hermon, Woking.
 SCHARFF, R. F., PH.D., B.SC., F.Z.S., M.R.I.A., National Museum,
 Dublin.
 SCULLY, R. W., F.L.S., Upper Fitzwilliam Street, Dublin.
 SHAW, LADY, Bushy Park, Terenure, Dublin.
 TOMLIN, BROCKTON, Llandaff.
 TOMLINSON, W. J. C., B. & N.C. Railway, Belfast.
 TURNER, HENRY J., F.E.S., Hatcham, London, S.E.
 USSHER, R. J., D.L., J.P., Cappagh, Co. Waterford.
 VOWELL, R. P., Dublin.
 WADDELL, REV. C. H., B.D., Saintfield, Co. Down.
 WARREN, ROBERT, Moyview, Ballina, Co. Mayo.
 WELCH, ROBERT J., 49 Lonsdale Street, Belfast.
 WILLIAMS, EDWARD, Dame Street, Dublin.
 WILLIAMS & SON, Dame Street, Dublin.
 WILSON, PROF. GREGG, D.SC., M.R.I.A., Queen's College, Belfast.
 WORKMAN, W. H., Windsor, Belfast.
 WRIGHT, JOSEPH, F.G.S., 4 Alfred Street, Belfast.
 WRIGHT, W. C., Belfast.

PLATES AND ILLUSTRATIONS.

Red-necked Phalarope (<i>Phalaropus hyperboreus</i>),	(Plate 1)	To face p. 41
<i>Vespa austriaca</i> and <i>Vespa rufa</i> ,	(Plate 2)	To face p. 221
Male armature of <i>Bombus</i> and <i>Psithyrus</i> ,	.	p. 232
Outline of Clare Island,	.	p. 278
Sketch-map of Clare Island,	.	p. 279
<i>Osmunda regalis</i> , variety,	.	p. 291
Maxwell H. Close,	.	To face p. 301

INDEX.

- Acrocephalus aquaticus*, 300.
 Adams, John : Distribution of *Vaucheria* in Ireland, 218.
Adicella reducta, 275.
 Alien flora, 137.
 Algæ, Fresh-water, of North of Ireland, 100.
Amphibole, blue, 1.
Andesite, alteration of, 9.
Annelids, marine, 273.
 Annual plants, 89.
Arabis ciliata, 272.
Arachnida of S. Kerry, 69.
Archangelica officinalis, 246, 316.
Arigna coal fossils, 92.
Arum maculatum, leaf-marking, 78, 108, 137, 145, 166, 204, 219.
Atriplex portulacoides in Down, 270.
 Bain, John, A.L.S., obituary notice, 192.
 Barrett-Hamilton, G. E. H. : A winter Song Thrush's nest, 138 : The Irish Black Rat in England, 167 ; Live Marten in Co. Wexford, 320.
 Barrington, R. M. : *Ranunculus Auricomus*, 197 ; Migration of the White Wagtail, 198 ; The Aquatic Warbler, a new Irish bird, 300. See also Vowel, R. P.
 Barrow, G., on Green Rocks of Tyrone (noticed), 3.
 Bat, Hairy-armed, 320.
 Beetles, in the broth, 108 ; from Roundstone, 167 ; new Irish, 274.
 Belfast and N. C. Railway Guide (noticed), 243.
 Belfast Natural History and Philo-sophical Society, 19, 51, 84, 103, 136, 265, 312.
 Belfast Naturalists' Field Club, 19, 51, 86, 102, 136, 169, 191, 194, 207, 266, 276, 313.
Belinurus, 4.
 Bell, Robert : Lower Lias reptilian remains at Belfast, 56.
 Benson, Rev. Charles W. : White Wagtail at Balbriggan, Co. Dublin, 300.
 Beresford, Denis Pack-, see Pack-Beresford.
 Birds, Harvey Collection, 55 ; of Donegal, 139 ; Spring rivalry of, 152 : of Moy estuary, 199 ; protection of, 203.
Blitum capitatum in Fermanagh, 271.
 Bog-flows, 140.
 Botanizing in the Ards, 254.
 Botany, see Flora.
 Boulder clay, foraminiferal, 173.
 Bouskell, Frank : Three weeks in South Kerry—General account and botany, 57.
 Brown, J. A. Harvie-, see Harvie-Brown.
 Bruce, W. Balfour : *Hybernian aurtaria* in County Wicklow, 138 ; The leaf-marking of *Arum maculatum*, 166.
 Burbidge, F. W. : The leaf-marking of *Arum maculatum*, 137.
 Bustard, Great, in Tipperary, 198, 248.
Buteo lagopus, 111.
 Buzzard, Rough-legged, 111.
 Caddis-fly, new Irish, 275.
Calandra granaria, 108.
 Calcifuge plants on limestone, 270.
 Cambridge, O. Pickard-, see Pickard-Cambridge.
 Campbell, D. C. : Wild Swans in Donegal, 88 ; Ruff at Inch, L. Swilly, 111 ; A winter Corncrake near Lough Swilly, 112 ; *Convolutus Hawk-moth* at Londonderry, 318.
 Carboniferous fossils, 92.
 Carpenter, G. H., and Denis Pack-Beresford : The relationship of *Vespa austriaca* to *Vespa rufa*, 221.
 Carr, J. W., on Plant Communities (noticed), 82.
 Carrothers, N. : *Blitum capitatum* in Co. Fermanagh, 271 ; *Lathyrus Aphaca* at Stranmillis, Co. Antrim, 317.
 Cave Fossils, 55.
 Cephalopoda, Carboniferous, 4.
Cepola rubescens in Ulster, 220.
 Chaster, G. W. : Two beetles from Roundstone, new to the Irish list, 167.

- Chaster, G. W., and B. Tomlin : The rediscovery of *Vertigo Lilljeborgi* in Ireland, 13.
- Cladocera, 210.
- Close, Maxwell H. (obituary), 301.
- Coast-erosion, 9.
- Cœcilianella acicula* in Co. Waterford, 54.
- Cole, G. A. J. : Recent papers relating to Irish Geology, 1; The unnatural history of an oil well, 141; A geological renaissance (review of memoir and map, sheet 112, Geol. Survey, drift edition), 117; On metamorphic rocks of Tyrone (noticed), 2; On *Belinurus* from Kiltoran (noticed), 4; Obituary Notice of Maxwell H. Close, 301.
- Cole, G. A. J., and J. A. Cunningham : Donegal lamprophyres (noticed), 1.
- Coleoptera, of Kerry, 59: new Irish, 274.
- Colgan, N. : The leaf-marking of *Arum maculatum*, 78; Some recent records for the flora of County Dublin, 186; *Hieracium sciaphilum* in Co. Dublin, 247.
- Collomia coccinea*, 244.
- Conchological Society of Great Britain and Ireland, 298.
- Copepods, 318.
- Cork Naturalists' Field Club, 52, 171.
- Corncrake in winter, 112.
- Cristatella mucedo*, 168.
- Crithmum* in Antrim, 245.
- Crow, Carrion, in Irish Channel, 139.
- Cunningham, J. A., see Cole.
- Cunningham, J. D. (notice), 81.
- Cuscuta Epithymum* in Wicklow, 107.
- Cuthbert, H. K. G. : Irish Aculeate Hymenoptera, 46.
- Davies, J. H. : Another locality in District XII. for *Atriplex portulacoides*, 270; Some plants near Banbridge, Co. Down, 271; *Iuzula albida*, var. *rubella*, in Ireland, 272.
- Deception by a Thrush, 320.
- Diptera of Kerry, 68.
- Diver, Red-throated, protection of, 199.
- Dixon, Prof. A. Francis (notice), 306.
- Dodder in Wicklow, 107.
- Donisthorpe, Horace St. J. : Three weeks in South Kerry—Coleoptera, 59; Orthoptera from South Kerry, 138.
- Dopplerite, 201.
- Drift, tidal, of pebbles, 276.
- Dublin Microscopical Club, 17, 84, 102, 135, 168, 244, 312.
- Dublin Naturalists' Field Club, 21, 52, 82, 87, 103, 170, 196, 207, 245, 268, 315.
- Dublin and Limerick Field Clubs, 207.
- Duck, Eider, at Malahide, 112.
- Eggs, Weights of, 295.
- Eider Duck at Malahide, 112.
- Entomological notes, 109.
- Entomostraca, fresh-water, 210; of Lough Gur, 273.
- Erosion of coast, 9.
- Falcon, Peregrine, 220.
- Fauna and Flora Committee, 124.
- Fauna of Kilkenny, 181; of Kerry, 57.
- Felstones, Donegal, 1.
- Field Club Union, 50, 70.
- Fishes, new Irish, 319.
- Fleming, W. W. : Involuntary capture of a Swallow, 299.
- Fletcher, L. : On the Crumlin meteorite (noticed), 11.
- Flora of Clare Island, 277; of Mid Cork, 137; of Down, 197, 254, 271; of Dublin, 186; of Kerry, 57, 108, 113; of Limerick, 209, 247; of W. Mayo, 269; of North-western Counties, 270.
- Foord, A. H. : On Irish Carboniferous Cephalopoda (noticed), 4.
- Foraminiferal high-level Boulder-clay, 173.
- Forgers of Nature's signature, 106.
- Fossils of Arigna mines, 92; of Boulder-clay, 173; of Gobbins caves, 55; Lias, 56.
- Foster, N. H. : Partial migration of Sparrows, 197; Merlins and Peregrines, 220; Observations on the weights of birds' eggs, 295.
- Gardiner, C. J., and S. H. Reynolds : On the Silurian beds of Kerry (noticed), 7.
- Geikie, Sir A. : On the Green Rocks of Tyrone (noticed), 3.

- Geological Survey: Summary of Progress (noticed), 10; Memoir and map, sheet 112 (reviewed), 117.
- Geology, Irish, Recent papers on, 1.
- Glossary of names of British Birds, by Hett (reviewed), 99.
- Glyceria festucaeformis*, 255, 317.
- Gobbins caves, animal remains. 55.
- Godwit, Black-tailed, in Moy estuary, 112.
- Gold, Irish, 5.
- Grierson, P. H.: *Cœciliana acicula* in Co. Waterford, 54; *Succinea oblonga* near Mallow, 54; Notes on the Mollusca of County Kilkenny, 307.
- Grout, A. J.: Mosses (reviewed), 297.
- Gull, Iceland, in Co. Londonderry, 198.
- Gunn, W. F.: *Arum maculatum* again, 219.
- Hart, W. E.: Habits of the Woodcock, 220.
- Harvey collection of birds, 55.
- Harvie-Brown, J. A.: The Red-necked Phalarope in Ireland, the Outer Hebrides, and Shetland, as a nesting species, 96.
- Hawfinch, in Co. Kildare, 111.
- Hawk-moth, *Convolvulus*, near Belfast, 318; at Londonderry, 318.
- Hemiptera from Kenmare, 101.
- Hepaticæ from Wexford, 132; of Donegal, 316.
- Hepaticæ of the British Islands, by Lett (reviewed), 45.
- Hett, C. L.: Glossary of names of British Birds (reviewed), 99.
- Hieracia*, new Irish, 311.
- Hieracium sciaphilum* in Co. Dublin, 247.
- Hind, Wheelton, and J. A. Howe, on "Pendleside group" of Carboniferous shales (noticed), 4.
- Hoopoe in Co. Wexford, 111.
- Howe, J. A., see Hind, Wheelton.
- Hybernation of queen wasps, 167.
- Hybernia aurantiaria* in Co. Wicklow, 138.
- Hymenoptera, aculeate, 46; of S. Kerry, 68.
- Ibis, glossy, 112.
- Ichnium*, 1.
- Index Animalium, by Sherborn (reviewed), 98.
- Infusorians, 242.
- Introduction of species, 106.
- Irish Bee Journal (noticed), 243.
- Irish Field Club Union, 50, 70.
- Irish Topographical Botany, additions in 1902, 23.
- Isopoda, land, 274.
- Isotoma viridis*, 102.
- Jennings, Alfred Vaughan, obituary notice, 116.
- Johnson, T.: Ireland, industrial and agricultural, 22.
- Johnson, W. F.: Entomological notes of the season, 109.
- Juncus tenuis* in Co. Down, 108.
- Juggermannia capitata* in Co. Down, 219.
- Kane, W. F. de V.: A contribution to the knowledge of Irish freshwater Entomostraca: Cladocera, 210; Entomostraca observed at Lough Gur, 273; A rare blind Amphipod from Lough Mask, 273; *Nisoniades tages* in Co. Mayo, 275; Lepidoptera taken near Limerick, 318.
- Kaye, W. J.: Three weeks in South Kerry—Lepidoptera, 66.
- Kidston, R.: Notes on some fossil plants from the 'Ariana mines, collected by Mr. Joseph Ryans, 92.
- Kilroe, J. R., and A. McHenry, on volcanic tuffs (noticed), 6.
- Knowles, M. C.: Notes on some additions to the flora of County Limerick, 249.
- Knox, Godfrey: Green Sandpiper in Co. Mayo, 248.
- Laboratory, Marine biological, 17, 47, 104, 123, 172, 276.
- Lamprophyres, of Donegal, 1.
- Land-shell pockets, 247.
- Lankester, E. Ray: Treatise of Zoology (reviewed), 242.
- Lathyrus Aphaca* in Antrim, 317.
- Leaf-marking of *Arum maculatum*, 78, 108, 137, 145, 166, 204, 219.
- Leebody, J. R.: Wild Swans in Donegal, 88.
- Lejeunia hamatifolia*, 168.
- Lepidoptera, near Limerick, 318.
- Lepidozia reptans, 18.

- Lett, H. W.: *Riccia glaucescens* in Ireland, 107; *Archangelica officinalis* in Ireland, 316; Hepatics of the British Islands (reviewed), 45.
 Lias fossils, 56.
 Limerick, proposed museum, 81.
 Limerick Field Club, 207.
Loligo eblanæ, 248.
Lophopus, 135.
 Lough Neagh plankton, 100.
Luzula albida, 272.
 Lyburn, E. St. J.: on Irish gold (notice), 5.
 MacArdle, D.: *Hepaticæ* from Co. Wexford, 132.
 MacHenry, A., see Kilroe, J. R.
Machetes pugnax, 111.
Machilis maritima, 102.
 Marten in Co. Londonderry, 139; in Co. Wexford, 320.
Masdevallia Veitchiana, 102.
 Mason, J. E.: Some Hemiptera from Kenmare, 101.
 Massy, A. L.: The marine Mollusca of Narin strand, Co. Donegal, 22.
Megaclinium triste, 312.
Melitæa aurinia, 275.
 Merlin near Belfast, 111, 220.
 Metamorphic rocks of Tyrone, 2, 3.
 Meteorite, Crumlin, 11.
 Migration of Sparrows, 197; of White Wagtail, 198.
 Minerals, Irish, list of, 12.
 Moffat, C. B.: Review of Hett's glossary of names of British birds, 99; The spring rivalry of birds: some views on the limit to multiplication, 152; Review of Robinson's My nature notebook, 193.
 Mollusca, land, 138; of Kilkenny, 307; Marine, of Narin, 22; Nudibranch, 319.
 Monkey, albino, 88.
 Morice, F. D., see Saunders, E.
 Morley, Claude, see Saunders, E.
 Moss, R. J.: An Irish specimen of *dopplerite*, 201.
 Mosses, of Donegal, 316.
Motacilla alba, 198, 300.
 Moth, Pine-bud, 299.
Mus hibernicus, 167.
 Museum for Limerick, 81.
 Naucrates ductor, 206.
 Niphargus in Lough Mask, 274.
Nisoniades tages in Co. Mayo, 275.
 Nudibranch molluscs, 319.
 Obituary notices: Rev. Maxwell H. Close, M.A., 301; John Bain, 192; A. V. Jennings, 116.
 Oil well, 141.
 Oldhamia, 1.
 O'Reilly, J. P., on coast erosion (noticed), 9.
 Orr, H. Lamont: *Convolvulus Hawk-moth* near Belfast, 318.
Orthagoriscus mola, 54.
 Orthoptera from S. Kerry, 138.
 Pack-Beresford, D.: Notes on wasps, 15; Hybernation of queen wasps, 167; The Pine-bud moth, 299; see also Carpenter, G. H.
 Palmer, J. E.: Hawfinches in Co. Kildare, 111.
Paludicella, 135.
 Patten, C. J.: Carrion Crow in the Irish channel, 139.
 Patterson, Robert: Marten in Co. Londonderry, 139; Iceland Gull in Co. Londonderry, 198; *Cepola rubescens* on the Ulster coast, 220; Breeding of Wigeon in Ireland—a correction, 275; Late stay of Swift, 320; *Vesperugo Leisleri*, 320; notice of, 82.
 Patterson, R. M.: An instance of deception on the part of a Thrush, 320.
 Pearson, Joseph, notice of, 123.
 Pendleside group of Carboniferous rocks, 4.
 Pethybridge, G. H.: The leaf-spots of *Arum maculatum*, 145.
 Phalarope, Red-necked, breeding in Ireland 41, 96.
Phalaropus hyperboreus, 41, 96.
 Phillips, R. A.: Notes on *Arum maculatum*, 204.
 Pickard-Cambridge, O.: Three weeks in South Kerry—*Arachnida*, 69.
 Pilot fish, 206.
Pinguicula grandiflora in Clare, 269.
 Plant communities, 82.
 Plants, Carboniferous, 92; of Mid Cork, 137. See also Flora.
Plegidus falcinellus, 112.
 Pockets of land shells, 247.
 Porter, William: County Down plants, 197.
 Praeger, R. I.L.: Additions to Irish Topographical Botany in 1902, 23; Review of Lett's Hepatics of the British Isles, 45; The Irish Field Club Union and its work,

- 70; What is an annual?, 89;
 Review of West's Contribution to the Freshwater Algæ of the North of Ireland, 100; The leaf-marking of *Arum maculatum*, 108, 166; Beetles in the broth, 108; *Juncus tenuis* in Co. Down, 108; Ten years' work of the Fauna and Flora Committee, 124; From the "Morning Post," 140; *Ranunculus Auricomus*, 197; Review of Westell's Country Rambles, 241; The Samphire in Antrim, 245; *Archangelica officinalis* in Ireland, 246; *Pyrola secunda* in Fermanagh, 246; Botanizing in the Ards, 254; New plants for West Mayo, 269; *Pinguicula grandiflora* in Clare, 269; Calcifuge plants on limestone, 270; New plants for north-western counties, 270; Coastal drift of pebbles, 276; The flora of Clare Island, 277; *Hieracium Orarium* and *H. rivale* in Ireland, 311.
Pyrola secunda in Fermanagh, 246.
 Raccoons at Dublin Zoo., 200.
Ranunculus Auricomus, 197.
Ranunculus circinatus in Antrim, 247.
 Rat, Irish, 167.
Retinia buoliana, 299.
 Reviews: B. and N. C. Railway's Guide, 243; Grout's Mosses, 297; Hett's Glossary of names of British birds, 99; Irish Bee Journal, 243; Lankester's Zoology, 242; Lett's Hepatics of the British Islands, 45; Robinson's My nature notebook, 193; Sherborn's Index Animalium, 98; West's Freshwater Algæ of the North of Ireland, 100; Westell's Country Rambles, 241.
 Reynolds, S. H., see Gardiner, C. J.
Rhinanthus segregates, 316.
Riccia glaucescens, 18, 107.
 Robin family, 239.
 Robinson, E. Kay: My nature notebook, (reviewed), 193.
 Royal Irish Academy, new members, 105.
 Royal Zoological Society of Ireland, 18, 52, 83, 101, 134, 168, 194, 206, 244, 265, 298, 312.
Rubus Chamaemorus, 317.
 Ruff in Donegal, 111.
 Samphire in Antrim, 245.
 Sandpiper, Green, in Mayo, 248.
 Saunders, E.: Three weeks in South Kerry—Hemiptera, 65.
 Saunders, E., F. D. Morice, and Claude Morley: Three weeks in South Kerry—Hymenoptera, 68.
Scapania intermedia, 269.
 Scharff, R. F.: Note on *Vertigo Lilljeborgi*, 14; Animal remains from the Gobbins caves, Co. Antrim, 55; Albino monkey, 88; Raccoons at the Dublin Zoological Gardens, 200; The Pilot Fish in Irish waters, 206; Review of Lankester's Treatise of Zoology, 242.
 Scottish Alpine Botanical Club in Kerry, 108.
 Scully, R. W.: Notes on the Kerry flora, 1902, 113; Some rare plants in Mid Cork, 137.
 Seymour, H. J.: On blue amphibole from Co. Down (noticed), 1; On Leinster andesite (noticed), 9; List of Irish minerals (noticed), 12.
 Shaw, Lady: The record of a Robin family, 239.
 Sherborn, C. D.: Index Animalium (reviewed), 98.
Silpha subrotundata, 274.
 Silurian rocks of Kerry, 7.
 Society for the Protection of Birds, 203.
 Sollas, W. J., on *Oldhamia* and *Ichnium* (noticed), 1.
Somateria mollissima, 112.
 Sparrows, migration of, 197.
 Spring rivalry of birds, 152.
 Squid, Dublin, 248.
Succinea oblonga near Mallow, 54.
 Sunfish, Short, in Moy estuary, 54.
 Swallow, involuntary capture, 299.
 Swallows in March, 198.
 Swans in Donegal, 88.
 Swift, late stay, 320.
Tetraplodon Wormskioldii, 135.
 Thrush, Missel, building on ground, 276.
 Thrush, Song, winter nest, 138.
Thuidium delicatulum in Co. Down, 219.
 Tidal fringes, 53.
 Tomlin, B.: A new Irish *Vertigo*, 110; see also Claster, G. W.
 Tomlinson, W. J. C.: *Ranunculus circinatus* in Co. Antrim, 247.

- Totanus ochropus, 248.
 Triarthrus Beckii, 244.
 Trichocolea tomentella, 84.
 Tuffs, volcanic, 6.
 Turner, Henry J : A week in Co. Kilkenny, 181.
 Ulster Fisheries and Biology Association, 17, 47, 104, 123, 172, 276
 Upupa epops, 111.
 Ussher, R. J : Swallows in March, 198.
 Vaucheria, 218.
 Vertigo Heldi, 110.
 Vertigo Lilljeborgii, 13.
 Vervet, albino, 88.
 Vespa austriaca, 221.
 Vespa rufa, 221.
 Vesperugo Leisleri, 320.
 Volcano in Co. Antrim, 140.
 Vowell, R. P., and R. M. Barrington : Rubus Chamæmorus again observed, 317.
 Waddell, C. H. : Thuidium delicatulum in Co. Down, 219; Jungermannia capitata in Co. Down, 219; Review of Grout's Mosses, 297.
 Wagtail, White, at Balbriggan, 300; migration of, 198.
 Warbler, Aquatic, 300.
 Warren, R. : Short Sunfish in the Moy estuary, 54; The Harvey collection of Irish birds, 55; Black-tailed Godwit in the Moy estuary, 112; Some ornithological notes from Moyview, 199.
 Wasps, 15, 167, 221.
 Weights of birds' eggs, 295.
 Welch, R. : Tidal fringes, 53.
 West, W. and G. S. : Contribution to the Freshwater Algæ of the North of Ireland (reviewed), 100.
 Westell, W. P. : Country Rambles (reviewed), 241.
 Wigeon breeding in Ireland, 275.
 Williams, E. : Breeding of the Red-necked Phalarope in Ireland, 41; Hoopoe in Co. Wexford, 111; Rough-legged Buzzard in Tyrone, 111; Glossy Ibis in Ireland, 112; Eider Duck at Malahide, 112.
 Williams & Son : The Great Bustard in Tipperary, 248.
 Wilson, Gregg : A proposed marine laboratory for Ulster, 47.
 Woodcock, habits, 220.
 Woodlice, 274.
 Workman, W. H. : Merlin on Colin Mountain, 111.
 Wright, Joseph : Foraminiferal high-level boulder-clay in the County of Dublin, and in Dumfriesshire and Ayrshire, 173.
 Wright, W. C. : Protection of the Red-throated Diver in its Irish nesting haunt, 199.

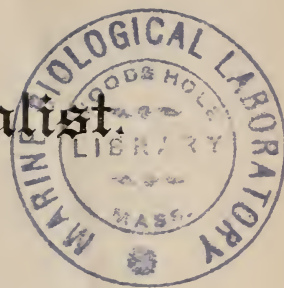
ERRATA.

Page 236, line 4 from bottom, *for* "ROBSON, J. E." *read* "ROBSON, CHARLES."

Page 272, line 6, *for* "west," *read* "road."

The Irish Naturalist.

VOLUME XII.



RECENT PAPERS RELATING TO IRISH GEOLOGY.

BY PROFESSOR G. A. J. COLE, F.G.S.

BLUE AMPHIBOLE.

Mr. H. J. Seymour describes a secondary blue amphibole, occurring as an outgrowth from primary green hornblende in a dyke of kersantite from Co. Down. The dyke lies three miles south-east of Portaferry. Occasionally the blue material replaces the original hornblende, and the occurrence is of interest as forming the first record of blue amphibole *in situ* in Ireland (*Geol. Mag.*, 1900, p. 257).

THE NORTHERN "FELSTONES."

Prof. Cole and Mr. J. A. Cunningham, A.R.C.Sc.I., describe several rocks occurring as dykes in Co. Donegal (*Sci. Proc. R. Dublin Soc.*, vol. ix., 1900, p. 314), and hitherto known as "felstones." These prove to be mostly lamprophyres, as Dr. Hyland had already indicated; a dyke of vogesite was discovered by Mr. Cunningham near Drumboy, and must be added to those upon the Survey map. The authors give reasons for assigning a Devonian age to these dykes throughout northern Ireland.

OLDHAMIA AND HISTIODERMA.

Prof. Sollas's detailed paper on the antique genus *Oldhamia* and a new genus *Ichnium* from Co. Dublin (*Quart. Journ. Geol. Soc. London*, vol. lvi., 1900, p. 273), has been already discussed in this Journal (vol. x., 1901, p. 81). Mr. G. F. Matthew, of the Canadian Survey, contributed some informa-

tion on the possibly allied genus *Monocraterion* to the *Irish Naturalist* for the same year, p. 135.

THE METAMORPHIC ROCKS OF NORTHERN IRELAND.

Prof. Cole (*Trans. R. Irish Acad.*, vol. xxxi., 1900, pp. 431-472), discusses the characters of the gneissic axis and associated green rocks of Tyrone. The latter are an igneous series, penetrated by granite of the Slieve Gallion type. Though imitations of gneiss on a small scale are produced at Cregganconroe by the parallel intrusions of this granite in a diorite of the "green rock" series, yet the central gneiss does not seem to have arisen from the attack of this particular granite on the overlying rocks. While the old gneiss is probably itself a composite rock, yet it was solidified at a very early date, as is shown by fragments torn from it and included in the granite of Fir Mountain. The author regards this granite as probably connected with the Caledonian or post-Silurian earth-movements.

Having thus sought to show that the central gneiss of East Tyrone owes its banded character to the intrusion of a pre-Caledonian granite into still older basic schists, the author passes to the area between Pettigo and Donegal Town, where the Dalradian rocks have been described by the Survey as resting on an older gneissic group. He believes, on the other hand, that the gneisses of South Donegal have intruded into the Dalradian series, of which they retain fragments in all stages of absorption. The Dalradians are thus the oldest known rocks in that part of the country. The whole complex group, including the granite, which has formed gneisses by its igneous flow and parallel intrusion, is probably of Archæan age. The paper is illustrated by six reproductions, in colour, of drawings by Mrs. Cole, made from microscopic sections, and by photographs of rock-structures.

Two years later (*Proc. R. Irish Academy*, vol. xxiv., section B, pp. 203-230), Prof. Cole emphasises the above conclusions in a paper on "Composite Gneisses in Boyleagh, West Donegal." This is mainly a petrographic essay on the production of gneiss by the intrusion of granite into rocks which already possess a parallel structure. In Donegal such rocks are provided by the Dalradian series, which retains

evidence of stratification, despite the conversion of its argillaceous members into mica-schist and its basic igneous members into epidiorite. The author minimises the alleged importance of pressure-metamorphism in the production of the gneiss of Boylagh, and regards that rock as essentially due to the flow of granite along the planes of parting in the folded Dalradian series. Incidentally, it may be observed that the intrusion of this granite is held to be connected (p. 204) with the Caledonian earth-movements. Since the author, in his earlier paper, recognised certain composite gneisses in Tyrone and Southern Donegal as probably of Archæan age, it may be asked whether he is now prepared to reconsider the matter, and to bring all these gneissoid granites into line as Caledonian. This may be possible in the County of Donegal, but would be a difficult matter in Tyrone, where the Slieve Gallion granite is known to be pre-Devonian, and yet cuts an already consolidated and ancient gneiss.

THE "GREEN ROCKS" OF THE POMEROY AREA IN TYRONE.

Sir A. Geikie (Discussion on a paper on Forfarshire, by Mr. G. Barrow, in *Quart. Journ. Geol. Soc. London*, vol. lvii., 1901, p. 344) again called attention to the green igneous rocks and cherts that bound the gneissic axis of Tyrone; he now regarded these as Silurian, and their accurate reading as likely "to remove some of the difficulties which still stand in the way of a satisfactory interpretation of the geological history of the structure and metamorphism of the Highlands of Scotland."

In consequence, Mr. G. Barrow, in 1902, visited the district in Ireland thus indicated, and is disposed to correlate the green rocks with his Forfarshire series, but to place the whole as pre-Silurian and probably Archæan. His preliminary paper was read before the British Association in Belfast (see *Irish Naturalist*, 1902, p. 277). The tuffs of Beagh-beg and Creggan, once regarded by Sir A. Geikie as Archæan, and subsequently as of Arenig age, may thus prove, after all, to be of the most venerable antiquity.

THE EARLIEST KNOWN BELINURUS.

A question having arisen in the *Ottawa Naturalist* as to the occurrence of the interesting limuloid genus *Belinurus* in Devonian strata, Prof. Cole (*Geol. Mag.*, 1901, p. 52) obtained permission to examine the original specimens from Kiltorcan in the collection of the Geological Survey in Dublin. He gives figures of the specimens, which are at present labelled as *Limuloides*. The author, however, cannot find hemiaspid characters in them, and would retain them under the name *Belinurus*, long ago assigned to them by W. H. Baily, and accepted by Dr. Henry Woodward.

CLASSIFICATION OF THE CARBONIFEROUS STRATA.

Dr. Wheelton Hind and Mr. J. A. Howe (*Quart. Journ. Geol. Soc. London*, vol. lvii., 1901, pp. 347-404) discuss the "Upper Limestone Shales" of Pendle Hill in Lancashire, and regard the fauna of these beds as later than that of the Yoredale series. They establish, therefore, a "Pendleside Group"—"series" or "stage" would have seemed a better term—for beds beneath the Millstone Grit, but with an Upper Carboniferous type of fauna. On p. 375 they refer certain "Upper Limestone Shales" in the north of County Dublin, and others on Foynes Island, Co. Limerick, to the "Pendleside Group." The latter were originally described as Lower Coal-Measures. Incidentally, a valuable revision of the fossil species known from these Irish beds is given on the page referred to.

CARBONIFEROUS CEPHALOPODA OF IRELAND.

Mr. G. C. Crick (*Irish Naturalist*, 1900, p. 14) has reviewed the first two parts of Dr. Foord's fine monograph on Irish Carboniferous Cephalopoda. Two parts have since appeared (*Palæontographical Society*, 1900 and 1901). On p. 72, Dr. Foord introduces a new genus, *Mesochasmoceras*, the types of which are in the collection of the Geological Survey in Dublin. It is a form of the *Cælonautilus* type, but is greatly flattened laterally, and has a very large hollow space at the centre of the coil. Three new species are described under *Vestinautilus* alone, in connexion with which the author points out (p. 92) how much might yet be done in collecting material from the south-western counties. This subject is clearly within the

province of the Limerick Naturalists' Field Club. Among the beautiful plates, one of the most striking is that of Dr. Foord's genus and species, *Acanthonautilus bispinosus*, a stout and coiled nautiloid, with a long flat hollow spine projecting on each side from the rim of the umbilicus. It was originally discussed in the *Geological Magazine* for 1897 (pp. 147 and 287); this volume is, by-the-by, according to the antiquated enumeration adopted by the Magazine, Decade iv., volume iv., and not volume ix. as quoted by Dr. Foord. The unique specimen figured has, like many of Dr. Foord's types, been secured for the Museum of Science and Art, Dublin.

On p. 132 we reach the Ammonoidea, and here, in the fascinating Goniatite series, Dr. Foord's work will be of especial service. In the later plates, we miss the singularly delicate touch of Mr. T. A. Brock, who was responsible for so many in the previous part. Dr. Foord, however, has carefully directed the draughtsman in all cases, and has himself contributed some of the original drawings. It is to be regretted that the Carboniferous horizons are so little traced in Ireland that the genealogical aspect of the numerous genera and species must be left to future writers. In many cases we are left to infer even the series in which the specimens occur from reading the lists of localities at the end of the descriptions. This is a little unkind to foreign students; and we sometimes wonder whether Dr. Foord does not use the term "Carboniferous" in his inmost heart as synonymous with the lower member of the system, the Carboniferous Limestone. This is, at any rate, what most of us do when confronted with Carboniferous mollusca; and we forget the increasing palæontological importance of the zones above the Upper Limestone. We cannot be too grateful for patient and persistent work on our little known Irish fossils, such as that undertaken voluntarily by Dr. A. H. Foord.

IRISH GOLD.

Mr. E. St. J. Lyburn, A.R.C.Sc.I., calls attention to the real need for systematic prospecting in Co. Wicklow (*Sci. Proc. R. Dublin Society*, vol. ix., September, 1901, p. 426), and gives the results of 110 assays of Irish rocks. The most important of these is a ferruginous quartz-vein from the Gold Mines

Valley, Croghan Kinshelagh. A number of igneous and metamorphic rocks from Mayo, Galway, and Tyrone were examined, but without success. The objections of the owner at present prevent further examination of the one hopeful district in Co. Wicklow; and there is much to be said for his views on the subject. If, however, he preserves the right to prevent indiscriminate mining on his land, a scientific survey might perhaps be some day rendered possible.

THE SO-CALLED VOLCANIC TUFFS IN OLDER IRISH STRATA.

Messrs. J. R. Kilroe and A. M'Henry (*Quart. Journ. Geol. Soc. London*, vol. lvii., 1901, p. 479), call attention to the intrusive character of many rocks hitherto mapped as volcanic tuffs, especially among the Silurian beds of southern Ireland. They show, in the course of a useful and salutary paper, how brecciation has occurred in dykes during the flow of the material, and that often the supposed tuffs may be much later than the rocks in which they lie. On p. 488 the Leinster granite is referred to as of Old Red Sandstone age; though connected with the Caledonian folding, it certainly may be contemporaneous with the earliest marine Devonian elsewhere. We doubt, however, if volcanic action began in the south of Ireland "after the limestone of Bala age was formed." There is indeed, convincing evidence to the contrary, at any rate in the region of Kildare and Dublin (see Gardiner and Reynolds, *Quart. Journ. Geol. Soc. London*, vol. lii., p. 604; vol. liii., p. 534, and liv., p. 147).

In the *Geological Magazine* for 1901, p. 515, the late Mr. Joseph Nolan objected to the inclusion of the Forkill agglomerate in Co. Armagh among the intrusive breccias of Messrs. Kilroe and M'Henry. He denied the existence in it of an andesitic matrix, and urged that the mass resulted from sub-aerial explosions—at least, we read this meaning into his quaint word "æriform." It is clear that microscopic examination of this rock is needed, as well as in the cases cited by Messrs. Kilroe and M'Henry. Slieve Gullion, we may remark, is here twice printed as Slieve Gallion, a slip that unfailingly escapes English editors.

RECENT CHANGES OF LEVEL ON THE NORTH-WEST EDGE
OF EUROPE.

The untiring and versatile Professor at Kristiania, Dr. W. C. Brögger, has issued (*Norges geologiske undersøgelse No. 31*, "Om de senglaciale og postglaciale nivaforandringer i Kristianiafeltet") a volume of 731 pages, dealing with the rising and falling of southern Norway during the later glacial ages. An excellent summary in English is appended. The work of the Rockall expedition of the Royal Irish Academy is quoted; and the occurrence of shell-banks of shallow-water species at great depths in the arctic North Atlantic area is held to prove (pp. 97 and 683) that the sea-floor has sunk 2,600 metres (8,500 feet) since the time of the greatest extension of ice-sheets across Europe. Such movements of course concern the land also, though in different degrees in different places; and it is obvious that a powerful weapon is here put into the hands of those who hesitate to deduce the behaviour of the ice-sheets in or near Ireland from the present relations of sea and land. Dr. Brögger's opinions are strengthened by a letter from Dr. Nansen, and go far to bury the last relics of the curiously popular but ungeological theory as to the permanence of ocean-basins. The paper is of value to every worker in glacial geology in Europe, by reason of the nineteen plates illustrating all the molluscan species of the faunas dealt with.

In the *Geological Magazine* for October, 1902, p. 479, Mr. J. Smith, of Monkredding, states that persons "acting under his directions" have found marine shells in boulder-clay four miles north-east of Muirkirk, in Ayrshire. Muirkirk lies on a high inland moor, and the bed is 1,330 feet above sea-level. It is not clear with what object Mr. Smith "directed" his friends to discover marine shells; but the further discussion of the deposit will be looked forward to by workers among Irish shell-bearing drifts, as bearing on the vexed question of submergence in particular.

THE SILURIAN BEDS OF WESTERN KERRY.

Continuing their revision of the areas where Silurian strata are associated in Ireland with contemporaneous volcanicaion, Messrs. Gardiner and Reynolds (*Quart. Journ. Geol. Soc. London*,

vol. lviii., 1902, pp. 226-266) have reported on the complex and attractive district of Clogher Head in the Dingle promontory.

The volcano was here of Wenlock and Ludlow age, and is thus almost unique in our islands. The beds are exposed in a series of fairly accessible coast-sections; but the prevalent southerly dip is at first deceptive. The authors trace an overfolded anticline between Cooshaun and Clogher Head, with consequent inversion of the beds at Clogher Head. There a thrust has pressed the whole series up over Old Red Sandstone; after which we begin the series again, but in correct order, down from a Ludlow horizon into the Ferriter's Cove beds and the barren Smerwick Beds of the extreme north.

The fossils of the Ferriter's Cove beds present a mingling of Llandovery and Wenlock forms; above them on the south is the Ludlow horizon, which has not been exactly located in the Ludlow series, as it stands revealed in Shropshire. Hence (p. 266) the lower part of the overlying Dingle series may possibly be of Upper Ludlow age. We are glad, however, that the authors retain the mass of the Dingle Beds as Lower Devonian. To deny, as Mr. Kinahan has done, the existence of Devonian (or true Old Red Sandstone) beds in Ireland is simply straining to breaking-point the arguments which had attracted Jukes shortly before his death. Had that eminent observer lived a few years longer, he would doubtless, in face of researches on the Devonian of the Continent, have withdrawn from so untenable a position.

We confess that we look back with affection on a little sketch made by us at Ballyferriter in 1895, and thereafter prudently concealed, in which, while adopting the great S-curve of the strata, we tried to throw in another fold on the north, and to read the Smerwick Beds as a repetition of the unfossiliferous Dingle Beds of the south. But this, based on a suggestion of Jukes, would have needed an unconformity between the Dingle Beds and the Silurians, whereby the Ludlows had become removed, except at Clogher Head. We naturally prefer to accept the reading now given, after such careful observation, by Messrs. Reynolds and Gardiner (pp. 228 and 263), whereby the Smerwick Beds are considered as the oldest in the district.

The great bands of volcanic tuff, with bombs some 20 cm. across, are so fresh in places, standing out like walls in the

little coves, that lovers of igneous rocks will find this remote and picturesque region as fascinating as it is to the stratigrapher.

DYNAMIC ALTERATION OF A LEINSTER ANDESITE.

Mr. H. J. Seymour (*Sci. Proc. Royal Dublin Society*, vol. ix. 1902, p. 568) has provided a delightful study of the changes set up in an igneous rock by pressure and accompanying molecular re-arrangement. At Deerpark Hill, near Donard, Co. Wicklow, dykes of andesite, of Lambay porphyry type, occur in Silurian strata, and are traversed by a tongue of the Leinster granite. Contact-metamorphism has consequently affected them; but the granite has sheltered them from the pressures which continued to accompany the uplift of the Leinster Chain. Farther north, however, at Ballymoonéy, the same series of dykes has borne the full brunt of the pressure, and the two types of metamorphism can be conveniently compared. The feldspars, under pressure, have become arranged in parallel planes, and have become elongated and leaf-like. Secondary biotite has arisen, and its crystals have increased in size as the molecular movements went on in the mass. The feldspars show strain-shadows under the microscope in the earlier stages of change; but in the more extreme examples each flake passes into a granular mosaic free from strain-shadows, the process of elongation now being carried on by solution and recrystallisation (p. 572). Van Hise is cited for similar observations in America.

The beautiful photographs furnished from actual hand-specimens give an admirable idea of the phenomena described. We may note that Mr. Seymour, unlike some of his colleagues, regards the dykes as of Bala age, on the evidence furnished by Lambay and Portrane.

COAST-EROSION.

Prof. J. P. O'Reilly (*Proc. Royal Irish Academy*, vol. xxiv., section B, 1902, pp. 95-202), discusses the desirability of recording, by systematic survey, the changes due to erosion or submergence of the Irish coast-line. About one hundred pages of the paper consist of quotations from various authors, many

of which bear very remotely upon Ireland. The question of the necessity of reprinting lengthy extracts from works easily accessible must be left to the publishing board of the Royal Irish Academy. Nor can we regard the extracts as critically chosen, when we consider the extreme difficulty of securing accurate evidence as to submerged towns or forests. Two pages are, for instance, occupied by quotations from Prof. Rhys, whose "*Celtic Folklore*" is scarcely a first-hand geological authority. Some references (as on p. 139) are given in order to show that they do not bear upon the subject, which is carrying conscientiousness somewhat far. Again, after sixty-one pages of extracts from the *Memoirs of the Geological Survey of Ireland*, we read that "in one of them alone is the waste of the coast of Ireland specifically alluded to and dealt with." This will fill the most patient reader with irritation. We should have welcomed a full bibliography, and a sifting of the evidence by one so experienced as the author. In place of this, we are treated like the man who met a philosopher in the forest. "Bear for me this burden of sticks," said the philosopher, "and we will seek the light at the ending of the day." The man lifted the burden, and carried it to a spot whence he could at length discern the sky. Then said the philosopher, who was withal a genial and kindly man, "Lo! thou seest this great burden, and the many sticks that are therein; of a truth, hadst thou taken but one of them, it would have brought thee sooner to the goal."

PROGRESS OF THE GEOLOGICAL SURVEY OF IRELAND.

The "Summary of Progress of the Geological Survey of the United Kingdom for 1901" was issued about October, 1902, and contains, as usual, a large number of new contributions to geological knowledge. When we read the chemical researches on "South Wales coals," the observations on recent railway-cuttings in England, and the very modern petrographic descriptions of rocks from the Scottish Highlands, we must sincerely regret the policy which has led to the abandonment of all such work by the Survey staff in Ireland. That staff, however, under the direction of Mr. G.

W. Lamplugh, has given us an admirable account of the drift-deposits and glacial features around Dublin (pp. 183-199). The Balrothery and Drimnagh esker, as described by Mr. M'Henry (p. 195), has been found to rest at one point on a water-worn surface of limestone, which is good evidence of its formation in a true sub-glacial tunnel "at ground level" (p. 187). Mr. Kilroe, who is largely quoted, regards the shelly gravels as derived from the washing of the boulder-clay during times of flood, and the boulder-clay as originally pushed up over the land, with marine shells in it, from the floor of the Irish Sea (p. 193). Mr. Wright describes a glacial gap connecting the valleys of Killakee and Glenasmole. We may be pardoned if we perceive, throughout these interesting pages, the mind of the accomplished District-Geologist, as gentle and yet as powerful in its moulding action as were the glaciers themselves, when they smoothed and harmonised the old-time asperities of the land.

THE CRUMLIN METEORITE.

Mr. L. Fletcher, F.R.S., of the British Museum (Natural History), describes in *Nature*, vol. lxvi., Oct., 9, 1902, p. 577, the fine meteoric stone which he has secured for the London collections. As is now well known from the paragraph in the *Northern Whig* for 17th Sept., the meteorite in this instance was actually seen to fall on 13th September, 1902, and was accompanied by considerable noise. It weighs about $9\frac{1}{2}$ lbs., and is one of the sporadosiderites of Daubrée, *i.e.* a rock formed of basic silicates with diffused particles of nickel-iron. The glaze on the surface, produced by the heat of friction with our atmosphere, is complete; but a portion of the stone must have been broken off in the air, the new surface thus formed being covered with a thinner glaze than the remainder of the stone. Mr. Fletcher presumes, from the limited area over which the stones of any one fall are distributed, that the missing portion fell into Lough Neagh.

The meteorite at present stands in a central position in the great hall of the National History Museum at South Kensington, and a coloured reproduction in plaster has been courteously presented by the Trustees of the British Museum to the

Museum of Science and Art, Dublin. Mr. W. H. Milligan of Belfast visited Crumlin on the 20th September, and sent an excellent account of the stone to the editor of *Nature*. Meanwhile, the Custodian of Minerals in the Dublin Museum had written from Scotland, and Mr. Andrew Walker, on whose farm the stone fell, responded promptly to the request that he should open negotiations. His letter, as has been stated in the *Irish Times*, was unfortunately forwarded to a wrong address; and thus, when Mr. Fletcher, with admirable promptness, appeared at Crumlin in person, he carried off the treasure to the unique collection at South Kensington. We shall look forward with the greatest interest to the complete description which Mr. Fletcher will publish in due course as the result of his detailed investigations.

IRISH MINERALS.

Mr. H. J. Seymour has published in the *Geological Magazine* (Nov., 1902, p. 500) a preliminary list of minerals occurring in Ireland, and promises a complete treatment of the subject at some future date. Even the present list must have entailed considerable research, since the author has taken the pains to assure himself of the validity of every record utilised. In consequence, some genuine records escape mention, owing to the lack of opportunity for verification on the part of the author. Among these we note the strontianite of Golden Bridge, Co. Dublin, the scapolite found by Scott at Glenleheen, and the orthite observed by Teall in the amphibolites of southern Donegal. If in this matter Mr. Seymour carries the critical spirit somewhat far, we must remember the remarkable laxity in the use of mineral names that has prevailed in certain Irish publications. Mr. Seymour's list at once arouses interest, by challenging collectors and curators to justify the claims of their collections.

Royal College of Science for Ireland.

THE RE DISCOVERY OF VERTIGO LILLJEBORGI IN IRELAND.

BY G. W. CHASTER AND BROCKTON TOMLIN.

IN 1845 J. G. Jeffreys discovered, on the shores of "a small lake at Ballynahinch, Co. Galway," a shell which he described seventeen years subsequently ("British Conchology," Vol. I., p. 255) as *Vertigo moulinsiana*, Dupuy. In the "Annals and Magazine of Natural History" for 1878, p. 380, this name was corrected to *Vertigo Lilljeborgi*, Westérhund, the true *V. moulinsiana* having been in the meantime discovered at Hitchin, Herts. The transfer of Jeffreys' collection across the "herring pond" to Washington removed possibly the only specimens extant in this country; and, since the original capture, *Vertigo Lilljeborgi* appears to have been as completely lost as the fields of Lyonesse, so far as the British Isles are concerned. At any rate, we have no knowledge of any subsequent capture until our own.

Being in the West of Ireland in September last, we resolved to arrange for a stay of several hours at Ballynahinch, in order to make a systematic search for the long-lost mollusc. On reaching our destination we found, to our dismay, that provisions were quite unprocurable—even the succulent blackberry was scarce. Let other conchologists on the track of *Vertigo Lilljeborgi* take warning! There remained nothing for it but to make the best of a bad business, and to work up enthusiasm—that unfailing consolation of the naturalist—so as to minimise the discomfort of the inner man. After reaching the lake our efforts for some time seemed likely to end in failure, one or two *Vertigo antivertigo* alone rewarding our search. At last, however, a shell turned up which both of us recognised as distinct from any British species of *Vertigo* with which we were acquainted. Then commenced a patient and protracted search, which eventually resulted in the accumulation of a fair number of specimens. We shall not easily forget our summer's day spent by the bonnie little lake, with its well-wooded shores and castled islet—a day of glorious sunshine, and, best of all, of success in regard to the special object of our visit.

Vertigo Lilljeborgi has been, of recent years, relegated to the position of a variety of *V. moulinsiana* in the British list. We fail to see any good reason for this, and consider the two forms entirely distinct. Dr. Scharff, who has examined our specimens, concurs in this opinion. The shells have a wholly different facies, although the general shape is similar. *V. Lilljeborgi* has a blunter apex and a much shorter body whorl in proportion to its size; it is darker in colour, and much more glossy; the umbilicus is less open, and the size is uniformly smaller by about half a millimetre in height and a quarter in breadth. At first acquaintance one was inclined to confuse it, not with *V. moulinsiana*, but with *V. antivertigo*; it has, however, a much blunter apex than the last-named species, and the teeth are quite different, being normally four in number.

We met with the species again at Roundstone, Co. Galway in a precisely similar habitat to that at Ballynahinch, so that it seems probable that it is widely distributed in the lakeland of western Galway. It is worthy of mention that our Roundstone specimens are considerably darker in colour than those from Ballynahinch.

On the Continent *Vertigo Lilljeborgi* occurs in Norway and Sweden, and was originally described by Westerlund in 1865 as *V. modesta*. As this name was found to be pre-occupied by Say, it was altered in 1868 to the one now in use.

Southport.

NOTE ON THE ABOVE PAPER.

The re-discovery of *Vertigo Lilljeborgi* in Ireland by Messrs. Chaster and Tomlin must be cheerful news to all conchologists, and it definitely settles the point whether Jeffreys' original discovery referred to this species or to the allied *V. moulinsiana*.

When I wrote my paper in the *Irish Naturalist*, vol. I, on the "Irish land and fresh-water Mollusca," I had not seen a specimen of *V. Lilljeborgi*, and a shell I took on the Aran Islands seemed to me to agree more closely with the description of *V. moulinsiana*, but as my only specimen has unfortunately been lost, I cannot now recompare it in the light of more recent researches. Possibly both species may occur on the west coast of Ireland, but until a specimen of *V. moulinsiana* is forthcoming it would be better to omit it from the Irish list.

R. F. S.

NOTES ON WASPS.

BY D. R. PACK-BERESFORD, D.I.

THE fact that I took a considerable number of males of *Vespa austriaca* last year led me to hope, that as there had evidently been a nest near here, the species might be found in still greater numbers this year. This hope has been fully justified, as will be seen by the following statistics of queens taken this spring as well as by some further facts to be related.

	1899.	1900.	1901.	1902.
Rufa, . . .	148	69	3	97
Vulgaris, . . .	28	40	10	53
Sylvestris, . . .	43	5	3	8
Norvegica, . . .	2	2	1	4
Austriaca, . . .	4	1	1	23
Germanica, . . .	—	1	2	11
Total, . . .	225	118	20	196

By the above table [the figures in the first column of which have been already published in the *Irish Naturalist*, but are repeated here for the sake of comparison], it will be seen that I took no less than 23 *austriaca* queens as against a maximum of 4 taken in 1899.

I can fully bear out the observations of Messrs. Barrington and Moffat,¹ that *austriaca* is apparently a late wasp, the first specimens having been taken on June 28th, by which date there were workers of *vulgaris*, *norvegica*, and *rufa* out, and the last on July 12th. By the latter date there were very few queens still about, but these few were mostly *rufa*, which thus seems to be one of the latest wasps as well as one of the earliest. Workers of *V. rufa* are always amongst the first to be seen in the spring, but they disappear early; hardly one will be seen after the end of August, though *vulgaris* will go on for three months after that.

¹ *Irish Naturalist*, Vol. X., p. 199.

The past summer has been a very cold one, and a very bad one for studying wasps in consequence, but I have had the luck to chance on a nest containing *austriaca*, which I had under observation for a considerable time, and which I hope to describe later on. After I took this nest I saw large numbers of *austriaca* males, and have captured a good many. Last year the first males of this wasp I took were on August 7th, and the last on August 25th. This year the earliest were taken on August 11th, and the latest on Sept. 11th. They have been about in far greater numbers than last year, in fact so numerous were they, that I several times caught two with one sweep of my net.

I have found them, too, this year in two different parts of my grounds, not being, as they were last year, confined entirely to one part. From this I gather that there have been at least two more nests near, besides the one I took. Last year I caught a good many *rufa* males at the same time as the *austriaca*, while this year I have only taken one, and that one varies in coloration considerably from the typical *rufa*. Last year I took a dozen or more *rufa* males, which varied from the usual coloration, but as I hope to have more to say about them later on I shall not further describe them at present.

I think it worth recording, that a nest of *V. sylvestris* was found at Raheny this year by a brother of mine, in the ground. In describing the nest, which he took and sent to me, he says: "It was on the edge of a pond about 18 inches from the water—about 6 inches in the bank and 6 inches below the surface of the ground."

Mr. Saunders, in his book, says of this wasp: "It makes its nests in the branches of trees; but Smith says that he once or twice found it inhabiting an underground nest." Ormerod, in his book on "British Social Wasps," also says: "This is, according to her markings and habits, a tree-wasp. But no place comes amiss; hollow trees, caves, hedge-banks, and bee-hives are all in their turn honoured by her selection."

It is also interesting, I think, to compare the above table with the statistics published last year by Messrs. Barrington and Moffat, as also with some wasp statistics published by Mr. E. Saunders. This gentleman found *V. germanica* to

¹ *Entomologist's Monthly Magazine* (p. 223, Sept., 1902).

greatly exceed all the other species put together in that part of England where his specimens were collected, and I was able to supply him with a further observation of my own; for in Northamptonshire, where I was paying a visit this spring, out of 56 queen wasps caught, 44 were *germanica*.

It seems to me not unlikely, that as *germanica* is distinctly a larger and a stronger wasp than *vulgaris*, where the two species come in contact, the former may tend to oust the latter. Messrs. Barrington and Moffat's statistics, as well as my own, seem to show a tendency to an increase in *germanica*, and it would be interesting to watch for further indications in this direction.

There are so many people of my acquaintance who kill queen wasps in the spring with a view to diminishing the attacks on their gardens, that I should like to make an appeal to all who do so to preserve those slaughtered, for identification. They could very easily be preserved by putting the carcasses into a bottle of spirits of wine, and I should be very grateful for any consignment that might be sent me.

Fenagh House, Bagenalstown.

NEWS GLEANINGS.

A Marine Laboratory for Belfast.

The recent suggestion made to the Belfast Natural History and Philosophical Society by Prof. Symington, as to the desirability of establishing a small marine laboratory in the North, will, we trust, be followed up. We are glad to notice that the needs of such an institution have been urged by Sir R. L. Patterson and others in the Belfast press. Fifty years ago Belfast was the centre of an enthusiastic group of marine zoologists; Thompson, Dickie, Hyndman, Waller, Patterson, and others made the North-east of Ireland famous by their work. But this interest all dropped away, till of recent years Joseph Wright has been the only Northern naturalist working at any marine group. We have reason to hope that the advent of Prof. Gregg Wilson will prove the dawn of better days, and that the North will reassert its old title to be looked on as a home of marine zoological research.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a number of Rainbow Trout and Carp from the Department of Agriculture, a Fox from Mr. T. D. Place, Monkeys from the Right Hon. J. Hogg, Mrs. W. J. Dermody, and Mrs. M'Donagh, four Crab-eating Opossums from the Hon. W. Rothschild, a Swan from Viscount Powerscourt, a Red-mouthed Diver from Prof. W. F. Barrett, a Badger from Mr. R. J. Ussler, a Seal from the Traders of Wicklow, a Peregrine Falcon from Mr. J. H. Montgomery, and Parrots from Miss L. Hopkins and Mrs. M'Carthy. A Racoon has been bought.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 8.—Mr. M'ARDLE showed plants of *Riccia glaucescens*, Carrington, under a dissecting microscope. It is remarkable for the glaucous surface of the radiating flabellate furcate fronds, which are composed of large cells arranged in regular series, thickened along the mid line of the lower surface; margin membranaceous, reduced to a single cell, with few horn-shaped cilia which are absent on some plants. Capsules few, occupying the central channel near the base of the frond; these were shown burst, under a high power by which the large muriculate convex spores were seen. The specimens were collected by Mr. M'Ardle in a stubble field, near Lough Salt, Co. Donegal, in September last; he is not aware that it has been previously reported from Ireland, and it is an interesting addition to the Irish cryptogamic flora. In England it has been found in Cornwall and Westmoreland, also in Wales and Scotland.

NOVEMBER 12.—Mr. M'ARDLE showed *Lepidozia reptans*, L., in fruit. The perianth is almost hyaline, membranaceous, the upper half consisting of a single layer of cells only, the lower half composed of two layers; it is cylindrical in shape, plicate towards the apex, which is constricted and dentate; the calyptra is large, oval, and composed of one layer of cells. The capsule is of a deep brown colour dividing into four equal valves. Spores minute, verruculose, reddish brown. Elaters narrow, bispiral. The specimens were collected last June on the Galtymore Mountains, Co. Tipperary, and though evenly distributed the plant is seldom found with perfectly developed fruit.

Prof. SCOTT showed the action of a light filter containing a solution of chromium sulphate. This substance gives a peculiar spectrum, allowing both red and green rays to pass, and suppressing almost all others. Objects when viewed by this light have these colours intensified, particularly those of a brownish or red colour. The result is similar to staining, the sections and objects already stained may be seen with increased brilliancy. It is especially valuable in finding faintly coloured red objects which are often nearly invisible by artificial light.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

DECEMBER 2.—Prof. REDFERN in the chair. The Secretary (R. M. YOUNG) announced a number of donations to the museum.

Prof. GREGG WILSON, D.Sc., read a paper entitled "Recent Fishery Research." He pointed out the great importance of our fisheries, and traced the progress of research on fish development, and on the fauna of the deeper waters. The dangers of over-fishing were referred to, and the establishment of hatcheries advocated.

Prof. SYMINGTON moved a vote of thanks to Professor Gregg Wilson for his lecture. He thought it was appropriate that they should consider on that occasion what should be done in connection with their own fisheries. With the exception of what was being done on the Western Coast there were absolutely no scientific investigations being conducted in any part of Ireland with regard to that question. In connection with that Society something might be done in the way of showing an example to the rest of Ireland. There was no difficulty in getting a suitable site for starting a modern laboratory.

Rev. D. A. PURVES, in seconding the motion, was sure that in Prof. Gregg Wilson not only Queen's College, but the city of Belfast, had received a great acquisition. He concurred with the suggestion that had been thrown out, and he did trust that the outcome of that meeting would be that steps would be taken to instal a modern laboratory in the region of Belfast.

The motion was carried and suitably conveyed by the Chairman, who referred to the time when many of the most eminent naturalists of Great Britain belonged to the North of Ireland.

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 12 — OPENING CONVERSAZIONE.—The winter session was opened by a successful conversazione in the Exhibition Hall. The attendance exceeded 300. Tea was served from seven till eight o'clock. Microscopes were made the leading feature of the evening, the following members exhibiting:—Miss MARY K. ANDREWS—Volcanic ash from St. Vincent; igneous rocks. JOHN DONALDSON—Pond life. W. D. DONNAN—Sections illustrating the structure of the body. WILLIAM GRAY, M.R.I.A.—A cabinet of microscopic preparations, illustrating a wide range of subjects—animal, vegetable, and mineral: methods of preparation and mounting were explained. HENRY HANNA, B.Sc.—Parasites of man. ALEX. MILLIGAN—Plant spores. H. M'CLEERY—Insect preparations and rotifers. ROBERT PATTERSON, M.R.I.A.—Marine larvæ. Miss C. PATTERSON—Live specimens. J. ST. J. PHILLIPS—Rock sections. CECIL SHAW—Sections of the larynx. ADAM SPEERS, B.Sc.—Rock sections. WM. SWANSTON, F.G.S.—Fossil sections. JAMES STELFOX, C.E.—Miscellaneous. JOSEPH WRIGHT, F.G.S.—Foraminifera of the Boulder-clay of Woodburn, Carrickfergus, Messrs. Lizards had a fine exhibit of

microscopes and microscopic accessories of all descriptions, which attracted much attention. The other exhibits were as follow:—

BOTANY.—N. CARROTHERS—Mounted botanical specimens. J. H. DAVIES—A bundle of *Hylocomium rugosum*, a rare Irish moss from Port-stewart. W. A. GREEN—Seaweeds from Ballycastle. F. GULBRANSEN—Plants from Botanic Gardens, N.S.W. W. H. PATTERSON, M.R.I.A.—Giant puff ball, from Shropshire. W. H. PHILLIPS—Rare British and other ferns. R. L. PRAEGER, M.R.I.A.—Additions to the flora of the North-east of Ireland, made in the Ardglass district, 1902. GEORGE E. REILLY—Specimens of New Zealand woods.

ZOOLOGY.—JOHN COTTNEY—Collection of Irish taken eggs. NEVIN H. FOSTER—Eggs of 97 species of birds breeding in County Down, W. A. GREEN—American fresh-water mussels. JOHN HAMILTON—Specimens of Indian "Tussora" silk moth. ROBERT MAY—Wood perforated by various animals. J. M'BRIDE, jun.—Eggs of tortoise, laid in Ireland. H. LAMONT ORR—Irish butterflies, &c. ROBERT PATTERSON, M.R.I.A.—Birds' nests. Down taken from various ducks. R. F. SCHARFF, M.R.I.A.—Remains of the Arctic Lemming, a new Irish mammal, and of other animals from Keash Caves, County Sligo. Master WHEELER—Humming birds and nests. Professor GREGG WILSON, D.Sc.—Eggs and embryos of Duckbill and *Echidna*. R. WELCH—Methods of mounting and storing small mollusca.

GEOLOGY.—ROBERT BELL—Cretaceous fishes from Counties Antrim and Derry. Madame CHRISTEN—Igneous rocks from Saxony; stone implements from Saxony. R. CHRISTEN—Cretaceous and other fossils from Saxony. Rev. H. QUAIL—Rock specimens. W. B. WRIGHT, B.A.—Ailsa Craig rock from Ballyhill.

MISCELLANEOUS.—Miss ANDREWS—Old coins. C. BULLA—Old Irish sword stick from Arboe and bones from Donegal caves and River Blackwater. W. A. GREEN—Irish bog butter, mounted photographs. A. R. HOGG—Animated photographs of natural history subjects. Miss L. LAMB—Photographs of two round towers at Ravenna, a few photographs of Italian churches showing interlaced patterns in the stone-work. ROBERT PATTERSON, M.R.I.A.—Autographs of members of the "Red Lion Club" present at the Belfast meeting of British Association, 1852. JOHN C. W. REID—Old Irish crossbow and Dublin-made pistols. GEORGE E. REILLY—African bark cloth, made by natives. R. WELCH—Evolution of the Irish outside car; wedding dance-masks from west coast of Ireland; photographs taken during the Club's summer excursions. Mr. Kilpatrick exhibited a number of photographs taken during the recent meeting of the British Association.

Punctually at 9.30 the President of the Club, F. J. BIGGER, M.R.I.A. took the chair, and delivered a short address. After welcoming the members of the Dublin Naturalists' Field Club, the representative of the Londonderry Scientific and Literary Society, and the newly-appointed Professor of Natural History in Queen's College (Professor Gregg Wilson, D.Sc.), Mr. Bigger went on to refer to the recent meeting,

of the British Association in Belfast. He drew the attention of members to the new feature introduced by the secretaries at the present conversazione for the first time—the bookstall, where the Club literature was on sale all evening. Here could be bought the Club's "Proceedings" and papers, the new British Association Guide, the "Irish Naturalist," and the "Ulster Journal of Archæology." The President then called on Professor Symington, M.D., who stated he had inserted an instruction in the present calendar of Queen's College to the effect that members of the Belfast Naturalists' Field Club would be admitted to the Natural History Museum of the Queen's College on presentation of their card. The College was most anxious to co-operate with a scientific club such as he was addressing, and members were welcome to make all the use they could of the College. This announcement was received with much applause. The election of twelve new members brought the formal business to a close, and the lantern display was then proceeded with the lantern being in charge of A. R. Hogg. The first set of slides shown dealt with microscopic objects. Photographs taken on the summer excursions were then shown. Other subjects dealt with were geological formations, Ballinderry old church, and New Zealand scenery, the exhibitors being William Gray, R. Welch, J. St. J. Phillips, W. J. Fennell, and George Reilly. Afterwards A. R. Hogg showed a splendid series of animated photographs of animal life.

DECEMBER 1.—The President, F. J. BIGGER, M.R.I.A., delivered an address entitled "Elizabethan Ireland." Two new members were elected.

BOTANICAL SECTION. NOVEMBER 24.—WILLIAM PORTER read a short paper on the study of our native Ferns. This branch has been selected for treatment during the ensuing winter session; the species to be dealt with in the same order as they occur in the *Flora of N.E. Ireland*.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 18.—F. W. BURBIDGE (Vice-President) occupied the chair, and fifty-two members and visitors were present. Mr. BURBIDGE read a paper dealing with the history and occurrence of the Yew tree in Ireland, and made special reference to the Yew trees at Crom Castle, near Enniskillen, visited by the Club last July. G. H. PETHYBRIDGE and R. LL. PRÆGER spoke on the paper.

H. J. SEYMOUR then gave an account of the joint excursion of the Belfast and Dublin Field Clubs to Enniskillen and Lough Erne, the narrative being illustrated by a large series of lantern slides taken by Messrs. Phillips and Welch, and by the speaker.

D. HOUSTON addressed the members on the question of holding Winter excursions in connection with the Club, and proposed the following resolution, which was seconded by R. LL. PRÆGER, and passed *nem. con.*:—"That it seems desirable to organise one or two winter field meetings in connection with the Club, and that the members hope that the Committee will make the necessary arrangements to carry this resolution into effect." Two new members were elected, and one nomination made.

NOTES.

BOTANY.

"Ireland: Industrial and Agricultural."

Mr. Praeger's statement in the *Irish Naturalist* (Dec., 1902, p. 362) that the definition of the "Irish Types of distribution" in my article on the Flora of Ireland are "quite erroneous" is surprising in view of the fact that they were written out for me by the reviewer himself, as his paper in the Academy's *Proceedings* had not appeared. In justice to the Handbook and to the readers of the *Naturalist*, it might have been stated that the article, for which I claim no credit, gave, thanks to the help I acknowledge in the article, a bibliography of the more important contributions to our knowledge of Irish mosses, liverworts, fungi, and algæ (fresh and marine), and not simply to the flowering plants in which the reviewer is more especially interested. The general features of the distribution of the flowering plants in Ireland are so fully dealt with in the new edition of the *Cybele Hibernica*, and in "Irish Topographica Botany," that little more than a reference to these works seemed to be necessary, having regard to the character of the Handbook.

T. JOHNSON.

Royal College of Science, Dublin.

[Perhaps Prof. Johnson will favour me with a sight of the note which I gave him.—R. L. P.]

ZOOLOGY.

The Marine Mollusca of Narin Strand, Co. Donegal.

The following do not appear to have been previously recorded from North-west Ireland. They are the results of drift collected last July:—*Margarita helicina*, Fabricius—numerous; *Eulima intermedia*, Cantraine—one specimen; *Tornatina mammillata*, Philippi—one specimen; *Ervilia castanea*, Montagu—two valves. This latter species seems to have only been recorded previously from Counties Cork, Kerry, and Galway. The drift also contained fourteen specimens of *Otina otis*, Turton (see *Irish Naturalist*, July, 1902). One valve occurred of *Modiolaria costulata*, Risso, apparently only previously recorded from Berehaven, Killala Bay, and Bundoran. *Alvania cancellata*, Da C., and *Pyrgulina indistincta*, Mont., var. *brevior*, were each represented by one specimen. *Eulima incurva*, Renier, *Odostomia turrita*, Hauley, and *Astarte triangularis*, Mont., were common. The drift contained altogether about fifty small species, some of which have been already recorded in Mrs. Tatlow's interesting paper on the Mollusca of south-west Donegal (*Irish Naturalist*, November, 1899). Dr. Chaster and Mr. J. T. Marshall have most kindly looked over the critical species.

A. L. MASSY.

Malahide.

ADDITIONS TO "IRISH TOPOGRAPHICAL BOTANY" IN 1902.

BY R. LLOYD PRAEGER, B.A.

DURING the year 1902 a remarkable advance has been made towards the completion of the county lists of Irish plants. A very considerable number of new county records has been published, and a still larger number have been reported to me by many workers, and are herein published for the first time. The most important papers dealing with Irish topographical botany which have appeared during the year are Miss Armitage's notes on Limerick plants,¹ G. R. Bullock-Webster's report on his Chara hunt in Monaghan,² W. Moyle Rogers' important paper "On the distribution of Rubi in Great Britain"³ [and Ireland], R. W. Scully's record of additions to the Kerry flora,⁴ and my own account of explorations in the North-east⁵ in 1902; all these contributions, except my own, refer to work done during 1901 or previously. My two papers "On Types of Distribution in the Irish Flora"⁶ and "Gleanings in Irish Topographical Botany,"⁷ also deserve mention as the most important summarizings of results issued during the year.

Of unpublished material supplied to me a magnificent contribution has been made by R. A. Phillips, who supplies fifty-six new county records, including a number of rare plants, from the southern half of Ireland. As preface to his notes, he writes as follows:—

Since the publication of "Irish Topographical Botany" in August, 1901, I have been taking desultory notes of the distribution of some of the rarer, as well as of the commoner, plants of which record is wanted to complete the county lists in that work. The following lists show the species I have been able to add to the county-divisions I have visited. The *Rubi* have all been determined by Rev. W. Moyle Rogers, F.L.S., to whom I am much obliged.

¹ *Journ. Limerick Field Club*, ii., No. 6, 138-143. 1902.

² *Irish Nat.*, xi., 141-6. 1902. ⁵ *Irish Nat.*, 200-210. 1902.

³ *Journ. Bot.*, xl., 150-7. 1902. ⁶ *Proc. R.I.A.*, xxiv. B, 1-60. 1902.

⁴ *Irish Nat.*, xi., 156-9. 1902. ⁷ *Ibid.*, 61-94. 1902.

The most important other contributions relate to the counties of Limerick, Westmeath, and Fermanagh. As regards the first, Miss Charlotte O'Brien has during the summer sent up to Miss Knowles at the National Museum a large set of plants, including many additions to the flora. Most of these specimens I have examined. From Westmeath Miss Reynell has contributed a reliable list, including many new records; while in Fermanagh the welcome explorations of J. T. Abraham and F. R. M'Cullagh have resulted in the addition to the flora of many interesting species, of which I have seen specimens by the kindness of W. N. Tetley. In Meath, W. A. Barnes has sought out diligently missing plants, and brought me a good number of additions. To Miss Knowles I am indebted for laying out for my inspection a number of plants from the National Herbarium, which appeared to constitute new county records. I have also to acknowledge welcome assistance given by Mrs. Gibbon, J. E. Grubb, and C. H. Waddell (Waterford), Miss Armitage and R. D. O'Brien (Limerick), P. H. Grierson (Clare and Cork), Mrs. Frank Joyce and W. L. Waithman (Galway), Stanhope Kenny (East Mayo), the Hon. Mrs. Wynne (Sligo), G. R. Bullock-Webster and Mrs. Clements (Leitrim), Miss Rosa Kane (Monaghan), W. N. Tetley and W. West (Fermanagh), Mrs. Leebody (Donegal), N. H. Foster and S. A. Moore (Down), Mrs. Frizell and C. J. Lilly (Antrim); and from the sister island C. P. Hurst, H. J. Riddelsdell, and A. Somerville have sent me notes on Irish plants collected by them.

Though the number of new county records in 1902 far exceeds that recorded in 1901, rare plants are not so conspicuous as in last year's list, and we have not so notable a trio to record as *Pyrola secunda*, *Spiranthes Romanzoffiana*, and *Carex irrigua*. The best plant of the year is *Nitella mucronata*, new to Ireland, and known from only half a dozen stations in Great Britain. Two of Mr. Scully's Kerry Hawkweeds, *H. cerinthiforme* and *H. rigidum*, represent great extensions of range, having been previously known in Ireland from the north-west only. The addition of two alpine Saxifrages to the flora of Fermanagh is an item of interest, as also the verification of Wade's 1804 record of *Dryas octopetala*. The finding of new and satisfactory stations for *Teesdalia nudicaulis* and

Brachypodium pinnatum is important, as proving the claim of these plants to rank as native species. My own work in Down added three plants—*Trigonella ornithopodioides*, *Artemisia maritima*, and *Potamogeton plantagineus*, to the flora of Ulster. If Mr. Rogers confirms his tentative record of *Rubus tereticaulis* P. J. M. from Ireland (Ballyvodock, 1900, R. A. Phillips—*Journ. Bot.* xl., 157) this will be an addition to the Irish flora.

In my paper published in this Journal just twelve months ago I recorded fifty-two new county records for 1901. The 1902 list is very much larger, totalling 207; this means an average increase of nearly one per cent. to the flora of each county-division as given in "Irish Topographical Botany." The new records are distributed as follows:—

- | | |
|--|------------------------------------|
| 1. KERRY S.— | <i>Hieracium gothicum</i> . |
| <i>Spargularia rubra</i> . | <i>Atriplex hastata</i> . |
| <i>Hieracium cerinthiforme</i> . | ‡ <i>Juncus glaucus</i> . |
| 2. KERRY N.— | |
| <i>Teesdalia nudicaulis</i> . | <i>Hieracium rigidum</i> . |
| <i>Cerastium arvense</i> . | <i>Lithospermum officinale</i> . |
| <i>Potentilla procumbens</i> . | <i>Atriplex hastata</i> . |
| ‡ <i>Galium Mollugo</i> . | * <i>Bromus erectus</i> . |
| * <i>Petasites fragrans</i> . | <i>B. racemosus</i> . |
| <i>Hieracium cerinthiforme</i> . | <i>Pilularia globulifera</i> . |
| 3. CORK WEST— | ‡ <i>Anthemis Cotula</i> . |
| <i>Rubus pulcherrimus</i> . | ‡ <i>Cuscuta Trifolii</i> . |
| <i>R. argentatus</i> . | <i>Orchis latifolia</i> . |
| <i>R. Questierii</i> . | <i>Brachypodium pinnatum</i> . |
| 5. CORK EAST— | ‡ <i>Crepis taraxacifolia</i> . |
| 6. WATERFORD.— | |
| <i>Pinguicula vulgaris</i> . | <i>Phleum pratense</i> . |
| <i>Lamium intermedium</i> . | <i>Ophioglossum vulgatum</i> . |
| 7. TIPPERARY S.— | |
| <i>Ranunculus sceleratus</i> . | <i>Myriophyllum spicatum</i> . |
| <i>Brassica alba</i> . | <i>Arctium minus</i> . |
| <i>Erodium cicutarium</i> . | <i>Samolus Valerandi</i> . |
| <i>Rubus corylifolius</i> (var. <i>cyclophyllus</i>). | <i>Potamogeton heterophyllus</i> . |
| 8. LIMERICK.— | ‡ <i>Althæa officinalis</i> . |
| ‡ <i>Papaver Argemone</i> . | <i>Linum angustifolium</i> . |
| <i>Polygala vulgaris</i> . | <i>Trifolium medium</i> . |
| <i>Lychnis diurna</i> . | <i>Rubus pulcherrimus</i> . |

LIMERICK—*continued*.

- | | |
|---------------------------------------|------------------------|
| Rubus radula (var. anglicanus). | *Mentha rotundifolia. |
| R. macrophyllus (v. Schlechtendalii). | *Plantago media |
| R. villicaulis (var. Selmeri). | Betula verrucosa. |
| R. Questierii. | Salix fragilis. |
| R. hirtifolius (var. danicus). | Habenaria chloroleuca. |
| R. micans. | Rhynchospora fusca. |
| Callitriche stagnalis. | Cladium Mariscus. |
| Peplis Portula. | Scirpus pauciflorus. |
| ‡Galium erectum. | Catabrosa aquatica. |
| *Inula Helenium. | Glyceria aquatica. |
| Myosotis collina. | Lepturus filiformis. |
| Veronica montana. | Asplenium marinum. |
| | Cystopteris fragilis. |
| | Lycopodium Selago. |

9. CLARE.—

Leontodon hispidus.

10. TIPPERARY N.—

Rubus leucostachys.

Neottia Nidus-avis.

*Tanacetum vulgare.

Melica uniflora.

‡Lolium temulentum.

11. KILKENNY.—

Rubus Borreri.

Lanium amplexicaule.

R. plicatus.

Carex muricata.

R. micans.

Phleum pratense.

R. Koeleri (v. dasyphyllus).

Cystopteris fragilis.

Equisetum maximum.

12. WEXFORD.—

Polygonum lapathifolium.

13. CARLOW.—

Rubus Koeleri (v. dasyphyllu).

14. QUEEN'S CO.—

Cerastium tetrandrum.

Epipactis latifolia.

Rubus scaber.

Carex dioica.

Myosotis versicolor.

Phleum pratense.

Agrostis alba.

15. GALWAY S.E.—

Ranunculus sceleratus.

Neottia Nidus-avis.

16. GALWAY W.—

Ranunculus penicillatus.

Verbascum Thapsus

Crambe maritima.

Phleum pratense.

†Viola odorata.

Catabrosa aquatica.

†Symphytum officinale.

Trisetum flavescens.

Bromus sterilis.

17. GALWAY N.E.—

Rubus dumetorum.

Phleum pratense.

Arctostaphylos Uva-ursi

Agrostis canina

Adiantum Capillus-Veneris.

18. KING'S CO.—

Ranunculus penicillatus.

I.athyris palustris.

Bromus erectus.

19. KILDARE.—

Carex sylvatica.

Phleum pratense.

20. WICKLOW.—
 **Matricaria discoidea*. Potamogeton plantagineus.
21. DUBLIN.—
 **Crepis biennis*. Milium effusum.
22. MEATH.—
Montia fontana. *Silybum Marianum*.
Caucalis nodosa. *Lysimachia nemorum*.
Bidens tripartita. *Veronica scutellata*.
Scleranthus annuus.
23. WESTMEATH.—
 **Clematis Vitalba*. *Senecio sylvaticus*.
 †*Lychnis vespertina*. **Cichorium Intybus*.
Cerastium tetrandrum. *Erica cinerea*.
Montia fontana. *Solanum Dulcamara*.
Hypericum humifusum. *Myosotis versicolor*.
Scandix Pecten-Veneris. *Veronica polita*.
 **Sambucus Ebulus*. *Orobanche Hederæ*.
Valerianella olitoria. †*Verbena officinalis*.
Filago germanica. *Thymus Serpyllum*.
Gnaphalium uliginosum. *Teucrium Scorodonia*.
Bidens tripartita. *Blechnum Spicant*.
24. LONGFORD.—
Orobanche Hederæ.
25. ROSCOMMON.—
Carex strigosa.
28. SLIGO.—
Cakile maritima. †*Verbascum Thapsus*.
Epilobium angustifolium. *Orchis Morio*.
29. LEITRIM.—
Polygala vulgaris. **Polygonum Bistorta*.
Epipactis latifolia.
30. CAVAN.—
Papaver Rhæas. *Carduus pycnocephalus*.
Nitella flexilis.
31. LOUTH.—
Trifolium filiforme. *Festuca Myuros*.
Equisetum hyemale.
32. MONAGHAN.—
Chara aspera (desmacantha.) *Chara contraria*.
C. hispida. *C. vulgaris*.
Nitella mucronata.
33. FERMANAGH.—
 **Papaver somniferum*. **Sedum reflexum*.
P. Rhæas. *Peplis Portula*.
P. dubium. *Chærophylum temulum*.
 †*Lychnis Githago*. *Oenanthe fistulosa*.
Saxifraga stellaris. †*Galium erectum*.
S. aizoides. †*Dipsacus sylvestris*.
 **Sempervivum tectorum*. *Vaccinium Oxycoccus*.

FERMANAGH—*continued*.

‡Verbascum Thapsus.
 Scrophularia aquatica.
 *Veronica peregrina.
 Pinguicula lusitanica.

*Chenopodium Bonus-Henricus.
 Juncus obtusiflorus.
 Butomus umbellatus.
 Alopecurus pratensis.

34. DONEGAL E.—

Malaxis paludosa.

36. TYRONE.—

Scleranthus annuus.

38. DOWN.—

Ranunculus penicillatus.
 Teesdalia nudicaulis.
 Stellaria palustris.
 ‡Geranium lucidum.
 Trigonella ornithopodioides.
 *Medicago maculata.
 Trifolium striatum.

Trifolium filiforme.
 Artemisia maritima.
 Statice occidentalis.
 Carex stricta.
 Potamogeton plantagineus.
 P. flabellatus.
 Chara polyacantha.

39. ANTRIM.—*Trifolium agrarium.

On the other side of the account one county record published in *Irish Topographical Botany* must be withdrawn, the supposed Cavan station for *Butomus* proving to be inside the Fermanagh boundary.

Along with the above increase, as compared with last year, of new county records, the number of new stations for rarer species is this year so largely augmented that it will not be possible in the space at my disposal to list even all the more important of these. The following systematic list includes only unpublished records of plants new to counties and of species previously recorded from one station alone; also a few instances where an extension of range in a county renders necessary a correction of the wording used in "*Irish Topographical Botany*," or where important confirmation of an old county-record has been forthcoming. The published new county records, numbering less than half the total for the year, will all be found in the *Irish Naturalist* for 1902 under the names Bullock-Webster, Colgan, Davies, W. F. Johnson, Hurst, R. A. Phillips, Praeger, and Scully, excepting those published in Miss Armitage's paper¹ and note² and in Mr. Rogers' paper³. The remainder of the unpublished material, to the extent of several hundred records, has been added to my slip-catalogue of Irish plant records, which now includes some 40,000 entries. Additions to the county floras are distinguished in the following list by having the name of the county printed in capitals:—

¹ *Loc. cit.*² *Journ. Bot.*, xl. 81, 1902.³ *Loc. cit.*

***Clematis Vitalba, L.**

23. WESTMEATH. Reynella and Baronstown—Miss Reynell.

Thalictrum flavum, L.

8. Limerick. Foynes, '02—Miss O'Brien !

Ranunculus penicillatus, Dum.

16. GALWAY W. Barna and Corrib River, '02—Phillips.
18. KING'S CO. Between Roscrea and Birr, '02—Phillips.
38. DOWN. Clanrye River near Sheepbridge, '01 (Lett)—W.B.E.C.,
1901-2.

R. scleratus, L.

7. TIPPERARY S. Cashel, '02 (W. J. Hardy)—Miss Knowles.
15. GALWAY S.E. Oranmore, '02—Phillips.

R. Auricomus, L.

23. Westmeath. Turin, '02 : frequent—Miss Reynell.

***Papaver somniferum, L.**

33. FERMANAGH. Newtownbutler, Belleek, Pettigo, '02—Abraham
and M'Cullagh.

P. Rhæas, L.

30. CAVAN. Fields $\frac{1}{2}$ mile S. of Mount Nugent, '02—Barnes !
33. FERMANAGH. Greenhill, '02, long established—Abraham and
M'Cullagh.

P. dubium, L.

33. FERMANAGH. Newtownbutler, '02—Abraham and M'Cullagh !

†P. Argemone, L.

8. LIMERICK. Foynes, '02—Miss O'Brien !

Brassica alba, Boiss.

7. TIPPERARY S. Garden weed at Cahir, '02—Phillips.

Lepidium hirtum, Smith.

22. MEATH. North of Carnross, '02—Barnes !

Crambe maritima, L.

- r6. GALWAY W. Gentian Hill, one plant on beach, '02—Phillips.

Viola odorata, L.

16. GALWAY W. † Barna, '01—Phillips.

Polygala vulgaris, L.

8. LIMERICK. Thornfields, '01—Miss Armitage.
29. LEITRIM. Lough Rynn, '02—Mrs. Clements !

Lychnis diurna, Sibth.

8. LIMERICK. Thornfields, '01—Miss Armitage.

†L. vespertina, Sibth.

23. Westmeath. ‡ Cornfield at Thornton—Miss Reynell.

†L. Glithago, Scop.

33. FERMANAGH. Gubbaroo Point, '02—Abraham and M'Cullagh !

Cerastium tetrandrum, Curtis.

7. TIPPERARY S. Railway at Limerick Junction, '02—Phillips.
14. QUEEN'S CO. Abbeyleix and Ballybrophy, '02—Phillips.
23. WESTMEATH. Railway at Athlone, '02—Phillips.

Montia fontana, L.

22. MEATH. Moynalty, '02—Barnes !
23. WESTMEATH. Killucan '02—Miss Reynell !

Hypericum humifusum, L.

8. Limerick. Thornfields, '01—Miss Armitage.
 22. Meath. Moynalty, '02—Barnes.
 23. WESTMEATH. Crooked Wood—Miss Reynell.

†Althæa officinalis, L.

8. LIMERICK. Foynes, '02 (Miss O'Brien)—Miss Knowles.

Linum angustifolium, Huds.

8. LIMERICK. Foynes, '02—Miss O'Brien !

Geranium lucidum, J.

- †38. DOWN. Helen's Bay ! '02 ; Stormount Castle, '02 ; and near Ballywalter—S. A. Moore ! *Killeen—S. A. Stewart.

The standing of this plant in Down is very doubtful. The Helen's Bay station, which I examined last summer, is a spot which I have known thoroughly for twenty years, and I feel confident that *G. lucidum* has only recently appeared there. The road has been repaired lately, and the plant grows on the repaired portion. The other three stations are all roadsides ; Mr. Stewart did not publish his Killeen locality, considering the plant a casual. An interesting station in Wexford of Barrett-Hamilton and Moffat's, where the plant, certainly introduced, has formed a roadside colony for some years past, appears to furnish a parallel instance. Soil conditions are against the plant's presence in either county.

Erodium cicutarium, L'Hérit.

7. TIPPERARY S. †Rock of Cashel, '02—Phillips.

Trifolium medium, Huds.

8. LIMERICK. Cahirmoyle, '02—Miss O'Brien !

Vicia hirsuta, Koch.

22. Meath. Moynalty, '02—Barnes !

Lathyrus sylvestris, L.

32. MONAGHAN. Wood at Ballyleck ; sown some years ago for fodder and now run wild abundantly, '02—Miss Rosa Kane

Rubus pilcatus, Wh. & N.

11. KILKENNY. Near New Ross, '02—Phillips.

R. pulcherrimus, Neum.

3. CORK WEST. Clear Island, '02—Phillips.

R. villicaulis, Koehl. (var. *Selmeri* Lindeb.).

8. LIMERICK. Thornfields, '01—Miss Armitage.

R. argentatus, P. J. Muell.

- Sherkin Island, '01—Phillips.

R. macrophyllus, Wh. & N.

2. Kerry N. Killarney, '01—H. J. Riddelsdell.

R. Questierii, Lefv. & Muell.

3. CORK WEST. Courtmacsherry, '02—Phillips.

R. micans, Gren. & Godr.

11. KILKENNY. Near Coppenagh Gap, '02—Phillips.

R. leucostachys, Schleich.

10. TIPPERARY N. Roscrea, '02—Phillips.

R. Borreri, Bell-Salt.

11. KILKENNY. Near Coppenagh Gap, '02—Phillips.

Rubus scaber, Wh. & N.

14. QUEEN'S CO. Ballybrophy, '02—Phillips

R. dumetorum, Wh. & N.

8. LIMERICK. Thornfields, '01—Miss Armitage (near
- tuberculatus*
-).

17. GALWAY N.E. Rocky fields near Menlo, '01—Phillips.

R. Koehleri, Wh. & N. (var. *dasyphyllus*).

11. KILKENNY. Graiguenamanagh, '01—Phillips.

13. CARLOW. Near Graiguenamanagh, '01—Phillips.

R. corylifolius, Sm. (var. *cyclophyllus*).

7. TIPPERARY S. Fethard, '02—Phillips.

Dryas octopetala, L.

33. FERMANAGH. Bar of Whealt [= Poulaphuca], '02—Abraham and M'Cullagh.

Geum rivale, L.

8. LIMERICK. Foynes, '02 (Miss O'Brien)—Miss Knowles.

25. ROSCOMMON. Kiltewan, '98 (Mapother)—
- Herb. S. & A. M.*
- !

Rosa rubiginosa, L.

8. LIMERICK. Foynes, '02.—Miss O'Brien!

Saxifraga stellaris, L.

33. FERMANAGH. North side of Cuilcagh Mountain, fairly plentiful, '02—Abraham and M'Cullagh!

S. aizoides, L.

33. FERMANAGH. Bar of Whealt [= Poulaphuca], '02, plentiful at waterfalls, 250–500 feet—Abraham and M'Cullagh!

***Sempervivum tectorum**, L.

33. FERMANAGH. Belleek, Drumclay, Bar of Whealt, '02—Abraham and M'Cullagh.

***Sedum reflexum**, L.

33. FERMANAGH. Bar of Whealt, '02, well established on houses—Abraham and M'Cullagh.

Myriophyllum spicatum, L.

7. TIPPERARY S. R. Suir at Clonmel and Carrick, '02—Phillips.

Callitriche stagnalis, Scop.

8. LIMERICK. Thornfields, '01—Miss Armitage.

Peplis Portula, L.

8. LIMERICK. Foynes, '02—Miss O'Brien!

33. FERMANAGH. Castle Caidwell, '02—Abraham and M'Cullagh.

Chærophyllum temulum, L.

33. FERMANAGH. Lisgoole abundant, '02—Abraham!

Scandix Pecten-Veneris, L.

23. WESTMEATH. Killucan district frequent, '02—Miss Reynell.

Ænanthe fistulosa, L.

33. FERMANAGH. Mouth of Ulster Canal near Belturbet, '02—West!

Caucalis nodosa, Scop.

22. MEATH. Moynalty, '02—Barnes!

***Sambucus Ebulus**, L.

23. WESTMEATH. Glenanea, '89—Miss Reynell.

†**Galium erectum**, Huds.

8. LIMERICK. Foynes, '02—Miss O'Brien !

33. FERMANAGH. Enniskillen Model School, well established on a lawn not disturbed for 30 or 40 years—Abraham and M'Cullagh !

Valerianella olitoria, Pollich.

23. WESTMEATH. Common about Killucan—Miss Reynell.

Dipsacus sylvestris, Huds.

33. FERMANAGH. †Lisgoole, '02, on an old ditch amid briars—Abraham and M'Cullagh.

Filago germanica, L.

23. WESTMEATH. Archerstown—Miss Reynell.

Gnaphallum uliginosum, L.

23. WESTMEATH. Killucan district frequent—Miss Reynell.

G. sylvaticum, L.

22. MEATH. North of Moynalty abundant, '02—Barnes.

***Inula Helenum**, L.

8. LIMERICK. Plentiful among willows near Foynes, '02—Miss O'Brien !

Bidens cernua, L.

8. Limerick. Thornfields, '01—Miss Armitage. Mullagh, '02—Miss O'Brien !

B. tripartita, L.

22. MEATH. Moynalty, '02—Barnes !

23. WESTMEATH. By R. Shannon near Athlone, '02—Phillips.

†**Anthemis Cotula**, L.

3. CORK. Clear Island and Hare Island, '02—Phillips.

***Matricaria discoidea**, D C.

20 WICKLOW. Greystones, '02—Miss Hughes !

Senecio sylvaticus, L.

23. WESTMEATH. Killucan, '02—Miss Reynell !

***Tanacetum vulgare**, L.

10 TIPPERARY N. Near Borrisokane, '02—Phillips.

Arctium minus, Bernh.

7. TIPPERARY S. Goold's Cross, '02—Phillips.

Carduus pycnocephalus, Jacq.

30 CAVAN. Roadside at Aghaloory, '02—Barnes !

***Silybum Marianum**, Gærtn.

8. LIMERICK. Foynes, '02 (Miss O'Brien)—Miss Knowles.

22. MEATH. Several places between Trim and Ballivor, '02—Barnes !

Centaurea Scabiosa, L.25. Roscommon. Moore, '97 (Mapother)—*Herb. S. & A. M.* !***C. Cyanus**, L.

33. Fermanagh. Gubbaroo Point and Tamlaght, '02—Abraham and M'Cullagh.

***Cichorium Intybus**, L.

23. WESTMEATH. Cornfield near Killucan—Miss Reynell.

†**Creplstaraxacifolia**, Thuill.

5. CORK EAST. ‡Railway at Midleton abundant, '01—Phillips.

Leontodon hispidus, L.

8. Limerick. Thornfields, '01—Miss Armitage,

9. CLARE. Sandhills at Lahinch, '01—Miss Armitage.

Arctostaphylos Uva-ursi, Spreng.

17. GALWAY N.E. Castle Lambert district plentiful, '02—Mrs. Frank Joyce.

Vaccinium Oxycoccus, L.

33. FERMANAGH. Brookeboro' and near Garvery. '02—Abraham and M'Cullagh.

Erica cinerea, L.

17. Galway N.E. Abundant on limestone pavements in Castle Lambert district—Mrs. Frank Joyce.

23. WESTMEATH. Knock Eyon, '01—Miss Reynell.

Lysimachia vulgaris, L.

6. Waterford. Belle Lake on Dunmore Road, '02—Mrs. Gibbon!

22. MEATH. Moynalty, '02—Barnes!

Samolus Valerandi, L.

7. TIPPERARY S. Cashel, '02 (W. J. Hardy)—Miss Knowles.

†**Symphytum officinale**, L.

16. GALWAY W. †Barna, '01—Phillips.

Myosotis collina, Hoffm.

8. LIMERICK. Cahirmoyle, '02—Miss O'Brien!

M. versicolor, Reichb.

14. QUEEN'S CO. Abbeyleix, '01—Phillips.

23. WESTMEATH. Knock Drin (Levinge)—Miss Reynell.

Lithospermum officinale, L.

7. Tipperary S. Cashel, '02 (W. J. Hardy)—Miss Knowles.

8. Limerick. Foynes, '02—Miss O'Brien!

†**Cuscuta Trifolii**, Bab.

3. CORK WEST. Sherkin Island, '01-2 (J. J. Wolfe)—Phillips.

Solanum Dulcamara, L.

8. Limerick. Thornfields, '01—Miss Armitage.

23. WESTMEATH. †Reynella—Miss Reynell. †By R. Shannon at Athlone, '02—Phillips.

Verbascum Thapsus, L.

16. GALWAY W. Salthill, '02—Phillips.

28. SLIGO. Near Clogherevagh, '01—Hon. Mrs. Wynne!

33. FERMANAGH. ‡Established on walls at Enniskillen, '02—Abraham and M'Cullagh.

Scrophularia aquatica, L.

33. FERMANAGH. Castle Caldwell, '02—Abraham and M'Cullagh!

Veronica polita, Fr.

23. WESTMEATH. Athlone, '02—Phillip.

V. montana, L.

8. LIMERICK. Foynes, '02—Miss O'Brien! Thornfields, '01—Miss Armitage.

Veronica scutellata, L.

22. MEATH. Moynalty, '02—Barnes!

***V. peregrina**, L.

33. FERMANAGH. Enniskillen abundant, '02—J. T. Abraham!

Euphrasia Sallsburgensis, Funk.

8. Limerick. Foynes, '02—Miss O'Brien!

Lathræa squamaria, L.

33. Fermanagh. Glencunny wood, '02—Abraham and M'Cullagh!

Pinguicula vulgaris, L.6. WATERFORD. Near Boola Loughs, '02—Lett and Waddell.
Near Crotty's Lough "year after year"—J. E. Grubb. Both
stations are on the Comeraghs.**P. lusitanica**, L.33. FERMANAGH. Near Castle Caldwell, '02—Abraham and M'Cul-
lagh.**†Verbena officinalis**, L.

23. WESTMEATH. Raharney, '01—Miss Reynell.

†Mentha rotundifolia, Huds.

8. LIMERICK. Lisnagry, '01—Miss Armitage.

Calamintha officinalis, Mœnch.

8. Limerick. Foynes, '02—Miss O'Brien!

Origanum vulgare, L.

23. Westmeath. Roadside at Derry—Miss Reynell.

Thymus Serpyllum, L.

23. WESTMEATH. Canal bank near Killucan, '00—Miss Reynell.

Lamium amplexicaule, L.

11. KILKENNY. Near Kilkenny, '01—Phillips.

L. intermedium, Fr.

6. WATERFORD. South of Clonmel, '01—Phillips.

L. hybridum, Vill.38. Down. In *I.T.B.* add "Not rare."**Teucrium Scorodonia**, L.

23. WESTMEATH. Crooked Wood, '01—Miss Reynell.

*** Plantago media**, L.

8. LIMERICK. Foynes, '02—Miss O'Brien.

Scleranthus annuus, L.

22. MEATH. Moynalty in fields, '02—Barnes!

36. TYRONE. Near L. Neagh, '59 (*Hb. Steele*)—*Hb. S. & A. M.****Chenopodium Bonus-Henricus**, L.

33. FERMANAGH. Belleek, '02—Abraham and M'Cullagh!

Polygonum lapathifolium, L.

12. WEXFORD. Enniscorthy, '02—Phillips.

***P. Bistorta**, L.

29. LEITRIM. Lough Rynn plentiful, '02—Mrs. Clements.

33. Fermanagh. Castlecoole, '02—Abraham and M'Cullagh

Neottia Nidus-avis, Rich

10. TIPPERARY N. Near Cloughjordan, '01—Phillips.

15. GALWAY S.E. Kilcornan, '99—Mrs. Frank Joyce.

Epipactis latifolia, All.

14. QUEEN'S CO. Near Carlow, '66 (F. Haughton)—*Herb. S. & A. M.*!
 29. LEITRIM. Lough Rynn, '02—Mrs. Clements!

Orchis pyramidalis, L.

29. Leitrim. Lough Rynn, '02—Mrs. Clements!

O. Morio, L.

28. SLIGO. Between Glencar and Sligo, '80 (F. W. Moore)—*Herb. S. & A. M.*!

O. latifolia, L.

3. CORK WEST. Schull and Goleen, '01—Phillips.

Ophrys apifera, Huds.

19. Kildare. Near Hill of Allen, and 6 miles west of Baltinglass, '02—Barnes.

O. muscifera, Huds.

19. Kildare. Ballycullane bog, '85 (Chandlee)—*Herb. S. & A. M.*!

Juncus obtusiflorus, Ehrh.

33. FERMANAGH. L. Keenaghan near Belleek—Hart, *Fl. Don.*

Butomus umbellatus, L.

33. FERMANAGH. Belturbet, '02—West and Tetley. This is the Cavan record of *I. T. B.*, transferred to its proper county.

Potamogeton heterophyllus, Schreb.

7. TIPPERARY S. Carrick-on-Suir, '02—Phillips.
 8. Limerick. Shannon at Hermitage, '01—Miss Armitage.

Cladium Mariscus, R. Br.

8. LIMERICK. Ringmoylan, '02—R. D. O'Brien and G. Fogerty!
 33. Fermanagh. Between Blayney and Benmore, '02—Abraham and M'Cullagh.

Rhynchospora fusca, R. & S.

8. LIMERICK. Castleconnell bog, '02—R. D. O'Brien and G. Fogerty!

Carex diolca, L.

14. Queen's Co. Near Rathdowney, '01—Phillips.

C. muricata, L.

11. KILKENNY. West of New Ross, '02—Phillips.

C. strigosa, Huds.

25. ROSCOMMON. Kiltewan, '97 (Mapother)—*Herb. S. & A. M.*!

C. laevigata, Smith.

8. Limerick. Ringmoylan, '02—R. D. O'Brien and G. Fogerty.

Alopecurus pratensis, L.

33. FERMANAGH. Common in Enniskillen district, '02—Tetley.

Phleum pratense, L.

6. WATERFORD. Cappoquin (T. Chandlee)—*Herb. S. & A. M.*!
 11. KILKENNY. Kilkenny and Callan, '02—Phillips.
 14. QUEEN'S CO. Durrow and Rathdowney, '02—Phillips.
 16. GALWAY W. Barna, '01—Phillips.
 17. GALWAY N.E. Near Menlo, '01—Phillips.
 19. KILDARE. Lodge Park, '64—*Herb. S. & A. M.*!

Agrostis alba, L.

14. QUEEN'S CO. Abbeyleix, '02—Phillips.

A. canina, L.

17. GALWAY N.E. Near Menlo, '01—Phillips.

Trisetum flavescens, Beauv.

16. GALWAY W. Near Salthill, '01—Phillips.

Catabrosa aquatica, Beauv.

16. GALWAY W. Near Salthill, '01—Phillips.

Melica uniflora, Retz.

10. TIPPERARY N. Near Roscrea, '01—Phillips.

Glyceria aquatica, Smith.

8. LIMERICK. Cahirmoyle, '02—Miss O'Brien! Corbally, '02—R. D. O'Brien!

Bromus erectus, Huds.

18. KING'S CO. Abundant on railway banks from Clara to Geashill, '02—Phillips.

B. sterilis, L.

16. GALWAY W. Salthill, '02—Phillips.

†**Lolium temulentum**, L.

10. TIPPERARY N. †Borrisokane, '02—Phillips.

Lepturus filiformis, Trin.

8. LIMERICK. Ringmoylan, '02—R. D. O'Brien and G. Fogerty!

Blechnum Spicant, Roth.

23. WESTMEATH. Knock Drin abundant, '01—Miss Reynell.

Cryptogramme crispa, R. Br.

38. DOWN. One clump in Hillsborough Park, '96—N. H. Foster!
-
- [A puzzle. ? Introduced].

Asplenium maritimum, L.

8. LIMERICK. Foynes, '02; formerly at Mount Trenchard—Miss O'Brien!

Cystopteris fragilis, Bernh.

11. KILKENNY. Near Coppengagh Gap, '01—Phillips.

Ophloglossum vulgatum, L.

6. WATERFORD. Ardmore and Tourin—R. J. Ussher!

Botrychium Lunaria, Swartz.

33. FERMANAGH. Five miles from Belcoo towards Garrison, '02—Abraham and M'Cullagh.

Equisetum maximum, Lamk.

11. KILKENNY. Freshford, '02—P. H. Grierson!

The most important discussion of the year dealing with topographical botany has been Mr. Colgan's criticism of my paper "On Types of Distribution in the Irish Flora," which he kindly contributed, by my request, to the August number of the *Irish Naturalist*. I have read with interest, and pondered over his remarks and if I now briefly refer to some of the points which he raises, it will be with whatever degree of

judgment may come from viewing the case from a half year's perspective.

Mr. Colgan's criticism deals mainly with a discussion of the boundaries of the type areas, and the composition of the lists of type plants, but, as I shall show, his conception and definition of my "types" being different from my own, it naturally follows that my lists of species will not fall in with his ideas. As regards the boundaries of the Ultonian, Mumonian, Lagenian, and Connacian types, I give in my paper (p. 34) a sufficiently conspicuous diagram showing the lines which bound them, and say (pp. 33-34) "The central circle and these two intersecting lines, then, define six types of distribution which I believe are founded on the actual range of plants in the country. The names most conveniently employed for the "types" will be 2. Central, 3. Marginal, 4. Ultonian, 5. Mumonian, 6. Lagenian, 7. Connacian, the last four being named after the four provinces of Ireland, in which each type respectively reaches its maximum." The wide extension thus allowed to each type, and the reason for associating the names of the four provinces with the last four, are thus stated sufficiently clearly. But after heartily approving of these names as thus defined, Mr. Colgan proceeds to express his expectation that each of these four types should be more or less restricted to the province from which the type takes its name:—"We might fairly conclude from this passage [portion of the passage which I quote above] that the area of each type would be roughly co-extensive with the province whose name it bore." I do not see that in the face of my statement we might fairly conclude anything of the sort; on the contrary, I cannot but think that such a conclusion is not warranted by my definitions. I quote the above as an instance of a tendency to restriction of area and a seeking for hard and fast boundaries which form a dominant note throughout Mr. Colgan's remarks on the "types." The clue to this view of the question is I think given by my critic when he refers to the Introduction of the second edition of *Cybele Hibernica* for lists of the northern, southern, eastern, and western plants of Ireland. Here, under the head of "Topographical Groups" we find lists compiled by the simple process of drawing a line across the map—along a parallel of latitude or longitude, a halfway between two—and listing all plants which occur *only*

on one side of it. Against the inexorable line there is no appeal. Be there a thousand plants of a species on the one hand, they are of no avail if there be one on the other. What are we to say of a list of "Western Plants" of Ireland (*Cybele*, p. lv.) in which *Saxifraga umbrosa*, *Euphorbia hiberna*, *Trichomanes radicans*, find no place?

My "types" have been formed according to a quite different principle. The distribution of species is infinitely varied. If we have 1,200 flowering plants in Ireland, then there are just 1,200 types of distribution. Mapped, the lines defining their range of occurrence and of frequency would appear as a complicated series of curves intersecting in every direction. The task to which I devoted six months, with what little success others must judge, was to discover by means of a study of the mapped range of each member of our flora the lines along which the most marked coincidences of such curves were to be found. These are the true phytological boundaries. The various "strong lines" thus appearing, had finally to be grouped into one or two simple curves, to represent the dominant floral boundary lines. Needless to say, these lines do not fit in with any parallels of latitude, or political provinces, or other artificial boundaries; but by an allowable generalization they may be shown as one or two simple and easily remembered lines or curves. Thus, instead of making the plants fit a prescribed boundary, it has been my aim to make the boundary fit the plants.

The same synthetic process may lead to a wide overlap between species of different types—another point of which Mr. Colgan falls foul. I may observe in passing that in the general conception of natural plant-groups, their boundaries, and overlaps, I have, as I stated in my paper, endeavoured to follow in the footsteps of our greatest botanical geographer, Hewett Cottrell Watson. Watson, indeed, omits (perhaps wisely) to lay down any bounding limit whatever for his British types; "Plants chiefly seen in West England" is a far vaguer type definition than mine, which my reviewer thinks are not definite enough. Then, as to overlap, we may find plants of Watson's English type far up in the Highlands, and "Scottish" plants on the shores of the English Channel. "Atlantic" species occur on the east

coast, and even "Germanic" plants—the most restricted type of all—may be seen in western counties. Possibly Mr. Colgan looks with marked disfavour on so broad a classification of our plants—but for myself, if I sin, I am well content to sin in so good company. If the broad view for which I have contended be applied to the lists of species set down under each of my types of distribution, and to Mr. Colgan's revision of them, I do not fear that my conclusions will be seriously imperilled.

So much for the general theory of the grouping of the flora under types, and its application. Another important and highly controversial question on which Mr. Colgan touches is the origin and history of our flora, where he attributes "oversight" and "confusion of thought" to my remarks on the Glacial epoch and its passing away in relation to the flora. On referring to the passage, I cannot detect any such features; but if there be, I fancy that, at least, I am not alone in these respects. My critic announces—with a confidence that geologists will envy—that the ground "at the close of the Glacial period was quite naked, a veritable *tabula rasa* from the botanical point of view." But in Introduction to *Cybele Hibernica*, p. xliv., the same writer states, with much reason, "we are hardly justified in supposing the glaciation of Ireland to have completely denuded the country of its plant population," and goes on to suggest the present condition and flora of Greenland as fairly representing what obtained in Ireland during the Glacial period. Now, the present flora of Greenland numbers, according to the latest authority¹, 386 species of flowering plants—a curious kind of botanical *tabula rasa*! I agree with Mr. Colgan in his earlier, not his later view, and it was to such a vegetation that I referred when I spoke of a "presumably weaker flora which was in possession of the ground" which is the statement which Mr. Colgan describes as an oversight. To judge from my critic's objection to my phrase "successive waves of plant migration," it would appear that his conception is that the Glacial period left the land absolutely bare, and, hey presto! our present flora took possession

¹ Warming: Ueber Grönland's Vegetation. *Engler's Bot. Jahrb.* x., 364 et seq.

of it. Can we not conceive the barren dreary wastes left by the ice, the gradual amelioration of the climate, the slow spreading of plant life, the tardy formation of soil, the gradual incoming of plant-group after plant-group, extending over thousands of years, and the extinction of previous occupiers, as changing conditions by degrees approached the present order of things? Bennie's interesting papers on Scottish glacial botany, and Clement Reid's writings, give vivid sketches of scenes in this long drama. I fancy that the phrase at which Mr. Colgan takes umbrage well expresses the facts of the case.

Lastly, as to Mr. Colgan's "butterfly"—the simile of a plant-army, of which the rear-guard are made to walk across ground considerably left ready for them by their predecessors. It appears that I was wrong in taking this passage seriously. The little butterfly might have been left to pursue its innocent flight. I drew attention to the simile because it appeared to me to convey a misconception of an important principle of plant migration. I am not an adept in the Lepidoptera, but am aware that certain species are far from harmless. Mr. Colgan's "butterfly" appeared to my non-entomological eye to be one of these, which, if left undisturbed, might work havoc in the fair garment of our scientific conceptions. It would be a pity to sacrifice correctness even for a pretty simile—or *semele*! I trust my little dose of camphor was not amiss.

National Library, Dublin.

NEWS GLEANINGS.

Congratulations.

Our congratulations to Dr. Scharff on his election to the Presidency of the Conchological Society of Great Britain and Ireland.

Also to H. J. Seymour, ex-secretary of the Dublin Field Club, on being appointed an Examiner in Geology in the Royal University of Ireland.

Also to our contributor, Dr. C. F. D'Arcy on his election to the Bishopric of Clogher.



RED-NECKED PHALAROPE (*Phalaropus hyperboreus*)

Male, Female, and Young

West of Ireland

BREEDING OF THE RED-NECKED PHALAROPE IN IRELAND.

BY EDWARD WILLIAMS.

[PLATE I.]

THE Red-necked Phalarope (*Phalaropus hyperboreus*) was unknown as an Irish bird till the year 1891, when, during the month of November, a great gale occurred and a quantity of Forktailed Petrels and Common Phalaropes were blown inland. Among the specimens I received were a Wilson's Petrel and a Red-necked Phalarope, both new to Ireland. The Phalarope was in full winter plumage, and was shot by Mr. J. A. Haire at Loughgilly, Co. Armagh. This specimen is now in the National Museum.

Nothing more was heard of this species till May, 1902, when I received a beautiful specimen in full summer plumage from Mr. J. A. Sheridan; the exact locality where he obtained the bird I have been unable to ascertain. It had a curiously malformed beak, turned up at the end like a miniature Avocet, and it showed in a very marked degree the beautiful bay colour on the neck, from which the bird derives its name.

Before giving an account of the discovery of this bird as a breeding species in Ireland, I may say that, seeing the sad havoc that has occurred to the species in the Orkneys and Shetland by egg collectors and others, I have resolved, in consultation with a few leading Irish ornithologists, not to divulge the exact locality of the breeding ground, but to say in a general way "the West of Ireland." I am also glad to say that the gentleman on whose property this very interesting discovery has been made shows every disposition to have the birds rigidly protected.

Early in the month of July last this gentleman sent me the skin of a Phalarope which had been rather roughly handled, but thinking that he had been on a yachting cruise round Scotland, and had probably obtained a specimen, it did not interest me much. In acknowledging the receipt I just said, "Of course the bird is not Irish." Judge of my surprise when

I received the following letter :—"The Red-necked Phalarope which I sent you was, of course, Irish, otherwise I would not have sent it to you. I now send two others shot to-day within a mile of the house. The birds breed here, and have, according to my keeper, done so for many years; he has also frequently found their nests, and on my questioning him he gave me a correct description of their eggs, colour, &c., &c. You will kindly set them up and give them on loan to the Natural History Museum" (where they now are).

In my reply I said that ornithologists would scarcely credit such a thing that this, a polar-breeding species, should be found breeding so far south, and begged him to set matters beyond all doubt by obtaining either an egg or young bird in the down. To my great delight, on 1st of August, I received a baby Phalarope, with a note, in which my correspondent said :—

"I am sorry to have to send you an uncontrovertible proof of the Red-necked Phalarope's nesting here. This is one of their chicks—I saw one other. The distress of the two old birds made it very hard to kill this little thing. During my tramp through the bog I counted seventeen, but there may have been many more; the most of the birds I saw were females. The tameness of these is very marked, as apparently unconcernedly they are seeking food within a distance of a few feet. It is my greatest desire that these birds should be perfectly protected and unmolested. I am surprised that these little chicks are able to survive their many enemies, especially as there are always a lot of Black-backed and other gulls on the bog."

The chick weighed 96 grains; plumage like a downy Dunlin, but down much more golden yellow about head and neck, shading into white on lower parts; two well marked white stripes on a black surface down middle of back. Feet inside flesh colour, outer parts dark, toes black, beak dark flesh.

The male bird, which is much more obscure in the colour, had two very large hatching spots on the breast, showing that he assists in the duty of incubation; he is smaller than the female, and weighed 589 grains. The female bird, strange to say, was assuming the winter plumage so early as the 14th July, and weighed 691 grains.

It may be here desirable to mention the chief differences existing between this bird and the much more common species, the Grey Phalarope (*Phalaropus fulicarius*) which occurs, I may say, annually on migration during the months of September and October. Both have the curious lobe-like appendages, similar to the Bald Coot, which distinguishes them from all other waders.

P. fulicarius is a good deal the larger of the two, measuring—length, 8.25 in.; wing, 4.9 in., whilst *P. hyperboreus* measures—length, 7.5 in.; wing, 4.4 in.

In their winter plumage the birds resemble one another, being a uniform bluish grey on the back, forehead, breast; down to the tail pure white. In summer they widely differ, the neck, breast, and lower parts in *P. fulicarius* being a brilliant chestnut red, back black, with a rufous margin to the feathers. *P. hyperboreus* in summer has the head, hind neck, and shoulders ash grey, back and wings rather darker, sides and front of the neck chestnut, upper breast grey, under parts white. Young birds of both species resemble one another in autumn, having the feathers margined with pale rufous. The feet are much less lobed than in the adult.

The following notes describing the breeding range and habits of this bird are from Mr. Howard Saunders' "Manual," and Yarrell's "British Birds," vol. iii. p. 316.

The Red-necked Phalarope breeds plentifully in the south of Greenland, Iceland, the Faroes, and above the forest growth on the Dofrefield in Scandinavia, as well as in the north; Nova Zembla, Siberia up to lat. 73°, as far east as Kamtschatka, and on the high ground by the Sea of Ochotsk. In Alaska, and through the Arctic regions of America, it is very abundant, and there again it nests by some of the lakes in the mountain ranges, as well as on the flat coast; while in winter, or on passage, it has been found down to the Bermudas and Guatemala. In the Old World its migrations extend to the Indo-Malayan region, its line through Central Asia crossing the Pamir range. Unlike its congener, it avails itself of the route by the valley of the Volga, especially in spring. It visits the Black Sea district and some of the inland waters of central Europe, and it occurs irregularly on both sides of the Mediterranean basin, though rare to the west of Italy. It is seldom found in the

west and north of France, Holland, or Germany ; but towards the north-east end of the Baltic it is not uncommon on the autumn passage, when it also visits the Swiss lakes.

The late J. W. Salmon, who visited Orkney in the summer of 1831, says of the Red-necked Phalarope:—" This beautiful little bird appeared to be very tame ; although we shot two pairs, those that were swimming about did not take the least notice of the report of the gun ; and they seemed to be much attached to each other, for when one of them flew to a short distance the other immediately followed, and while I held a female that was wounded in my hand its mate came and fluttered before my face. We were much gratified in watching the motions of these as they kept swimming about, and were for ever dipping their bills into the water ; and so intent were they upon their occupation, that they did not take the least notice of us although within a few yards of them.

" After some little difficulty we were fortunate in finding their nests, which were placed in small tufts of grass growing close to the edge of the lock ; they were formed of dried grass ; and were about the size of a titlark but much deeper. The eggs are considerably smaller than those of the Dunlin, and beautifully spotted all over with brown. They had but just commenced laying, June 13, as we found only from one to two eggs in each nest ; but we were informed by a boy whom we engaged in our service that they always lay four, and are called by the name of half-web."

In the Hebrides they usually arrive in the latter part of May, and by August both old and young have taken their departure.

The late W. Proctor contributes the following experiences obtained in Iceland :—The young birds leave the nest as soon as hatched. On the approach of danger the old bird runs among the aquatic herbage, spreading her wings and counterfeiting lameness for the purpose of deluding the intruder ; and after leading the enemy from her young she takes flight and flies to a great height, at the same time displaying a peculiar action of the wings ; then descending with great velocity, and making simultaneously a noise with her wings. On her return to her young she uses a particular cry for the purpose of gathering the young together. As soon as she has collected them she covers them with her wings like the domestic hen.

In conclusion, I would like to pay a tribute to the keen ornithological foresight of my friend the late A. G. More (whose loss to our favourite science we so much deplore) who, alluding to this species, uses, in his List of Irish Birds, these remarkable words:—"The Red-necked Phalarope, which breeds in several parts of the west of Scotland, has not yet been found in Ireland, though it might well be expected to occur." Viewed in the light of this recent discovery, do not the words seem almost prophetic?

Dublin.

REVIEW.

BRITISH LIVERWORTS.

A List, with descriptive notes, of all the species of Hepaticas hitherto found in the British Islands. By HENRY WILLIAM LETT, M.A., M.R.I.A., Rector of Aghaderg, Co. Down. Pp. x + 200. 1902. Printed for the author. 7s. 6d.

Canon Lett, well known as an Irish bryologist, has given us a little book that will be useful to all students of the Liverworts. The author tells us that his essay is an expansion of notes made for his own use.

The work is in reality a handbook, with full descriptions of species, well printed, followed by notes on habitat, distribution, and affinities, in smaller type. While following in general the style adopted in most books of the kind, a number of minor departures are noticeable, none of which we look on as improvements. The names of the plants are frequently separated from the authority by a full stop. The contractions employed in the references which follow the names are often awkward. The order in which the genera are arranged does not appear to follow any standard work. *Nardia revoluta* is included in the list on account of the Wicklow record, which rests on doubtful authority. The interesting Irish variety *leptodesma* of *Pallavicinia hibernica* is not referred to.

In giving a brief indication of the distribution of each species, Canon Lett uses the eighteen provinces of Watson for Great Britain, and for Ireland the counties arranged alphabetically. Why Ireland is thus favoured with a much more minute subdivision than Great Britain as a work intended for all British students is not clear; the employment of the twelve districts of *Cybele Hibernica* would have given a more uniform scale for comparison, as well as a corresponding passage from south to north. The abbreviations used for the Irish counties are confusing.

Canon Lett's "List" will serve a very useful purpose in providing the bryologist with a portable handbook, and we cordially congratulate the author on its production.

IRISH ACULEATE HYMENOPTERA.

BY H. K. GORE CUTHBERT.

IN a note on Col. Yerbury's Kerry list of aculeate Hymenoptera¹ I find it stated that "a comparison of this list with the recorded Irish species shows that no fewer than twelve were previously unknown to occur in Ireland." Among the twelve is *Crabro iv-maculatus*, recorded by P. E. Freke from Courtown.² The specific name *geniculatus* was given by Shuckard to the species properly known now as the *iv-maculatus* of Dahlbom. The term "var. *geniculatus*" is applied by modern authors to the dark form, recognised by Freke in above reference.

Another of Col. Yerbury's insects, *Bombus jonellus*, was recorded by me³ from Rosscarbery as *B. schrimshiranus*, the synonym for *jonellus* most used in the British lists. This species is also upon Freke's list. The other ten species as such have been unrecorded. Most of them are very distinct and conspicuous, but two or three are so closely allied to common insects, from which they can only be separated by obscure anatomical differences in the male sex, that it is probable they have been assigned in error in our list to their allied species. It may be useful to bring together here all the additions to the Irish list of aculeate Hymenoptera since 1897.⁴

Pompilus unguicularis, Thoms.—Kerry (Yerbury).

P. pectinipes, V. de L.—Sneem, Co. Kerry (Cuthbert)

Crabro cetratus, Shuck.—Kerry (Yerbury).

C. chrysostomus, Lep.—Kerry (Yerbury).

Odynerus trifasciatus, Oliv.—Kerry (Yerbury).

Prosopis hyalinata, Smith.—Quaker Island, Lough Ree (Dillon).

Colletes montanus, Mor.—Kerry (Yerbury).

Andrena fuscipes, Kirb.—Kerry (Yerbury).

A. labialis, Kirb.—Kenmare, Co. Kerry (Cuthbert).

A. cetii, Schr.—Kerry (Yerbury).

A. humilis, Imh.—Kerry (Yerbury).

Nomada roberjeotiana, Panz.—Kerry (Yerbury).

Cœlioxys vectis, Curt.—Swords, Co. Dublin (Cuthbert).

Megachile willughbiella, Kirb.—Kerry (Yerbury).

On July 27th last, I captured, in a gravel pit at Lucan, two examples of *Nomada furva*, Panz., recorded by Haliday, but not taken in Ireland since his time.

The Irish list now contains 148 species in 32 genera.

¹ *Irish Nat.*, vol. xi., 1902, p. 186. ² *Ib.*, vol. v., p. 41. ³ *Ib.*, vol. iv., p. 305. ⁴ *Ib.*, vol. vi., p. 324.

A PROPOSED MARINE LABORATORY FOR ULSTER.

BY PROFESSOR GREGG WILSON, D.SC.

As was mentioned in the *Irish Naturalist* for January, it is proposed to establish a marine laboratory somewhere on the coast of Ulster. There seems to be a widespread feeling in Belfast and the neighbourhood that the study of the fauna and flora of the northern parts of the Irish coast has been too much neglected of late, and what is equally important, there seems to be a desire on the part of many of the field-naturalists of Belfast to turn to, and do some good work at the "harvest of the sea." A considerable number of the members of the Belfast Natural History and Philosophical Society and of the Belfast Naturalists' Field Club are enthusiastically supporting the establishment of the proposed marine laboratory. It would appear that a very natural ambition has arisen to fill some of the gaps in the fauna and flora lists of the admirable recent British Association *Guide to Belfast*.

Besides those who regard the proposal merely from the point of view of the naturalist, there are, however, not a few who look to the suggested station as likely to be of importance in connection with the fisheries of Ireland. In almost every civilised country that has fisheries worth caring for, efforts are being made to obtain a thorough knowledge of the numbers, distribution, habits, and life-histories of the fishes, molluscs, crustaceans, and other forms that are used for food or as bait. Even the organisms that are consumed by the food-fishes are studied as being of importance—*e.g.*, in determining to some extent the movements of the fishes. Moreover, the enemies of the fishes, and of animals used as bait, and of the food of fishes are no less regarded as worthy of attention. This being so, it appears to many that similar work should be carried on to a greater extent than it is at present in Ireland. Undoubtedly, Mr. Holt and his assistants are doing good work; but it is chiefly in the South and West, and

Ulster needs to be attended to as well. Its fisheries require to be developed, and very likely in course of time they will have to be saved from overfishing. They should certainly be carefully watched.

The fish of any district require local study. The size of maturity in the Plaice, for instance, is very different in the English Channel from what it is in the North Sea. Similarly, there are marked differences in the times of spawning of fish, crabs, &c., at different parts of the British coasts. Such differences become of great importance whenever there is any talk of restrictive legislation; when, for example, it is proposed to have a size-limit or a close-time.

Knowledge that is less directly useful, however, is also of interest to the student of fisheries, and the Belfast naturalists could do valuable work, even if they never tackled any of the greater fishery problems. The task of identifying the contents of the tow-net and dredge is still a difficult one, and in particular the identification of larval forms may be mentioned as likely to furnish material for many students. The purely economic zoologist will be grateful for any help in this direction. He must learn to know what he is handling, whether it be of direct use to man or not.

The first definite step towards the formation of the new Biological Society was taken in December, when the Council of the Belfast Natural History and Philosophical Society called a meeting of delegates from itself, the Queen's College, and the Belfast Naturalists' Field Club to consider the subject. The delegates heartily approved of the inauguration of an Association for the study of the fauna and flora of our seas and fresh-water loughs; and committees are now at work arranging to give effect to this scheme.

Probably the new Association will from the first not confine its labours to salt-water forms, but will devote a considerable amount of attention to the fresh-water loughs of Ulster. Lough Neagh and several other of the larger sheets of water in the district present an attractive field for investigation. Both the pure naturalist and the student of economics will find much work to be done in these waters. The habits of the Pollan and the Eel are little known, and

these fish are of special interest because they yield a revenue of a good many thousand pounds a year. The movements of the forms on which these fish feed, their reaction to seasonal changes, and their whole history ought to be carefully inquired into.

It is obvious that, however willing the naturalists of Belfast may be, the majority of them will only be able to devote an occasional day to collecting material for study, and accordingly the Association will aim at having a trained naturalist and a boatman constantly employed in obtaining and sorting out plants and animals for the workers. The Honorary Director will have charge of the apportionment of the spoil to the various members and others, and reports will, from time to time, be issued, with results. It is not proposed to oppose in any way the existing scientific Societies of Belfast; but, on the contrary, it is expected that these Societies will serve as agents for publishing many of the finds of the new Association.

The one difficulty in the way of starting work is the need of funds. It is estimated that to carry on the work, even on the moderate scale proposed, would involve an outlay of about £300 a year, as well as a considerable initial expenditure, and it is too much to expect the workers of the Association to provide such a large amount. In view of the probable utility of the work to be done, it is thought that public-spirited men, and even the Department of Agriculture—which has done so much already for the fisheries and other industries—may come to the help of the Association. A few gentlemen have already come forward to give the scheme a start, and what is now wanted to ensure a fair chance of good work being done, is a subsidy from the Department of Agriculture, or a number of promises of annual contributions from private well-wishers.

Queen's College, Belfast.

IRISH SOCIETIES.

IRISH FIELD CLUB UNION.

We are requested to publish the following statement, which has been transmitted to the four Clubs constituting the Field Club Union :—

DIGEST, 1902.

The work done during the year has consisted of an exchange of lecturers between the Clubs more full than for some years past. Belfast sent a lecturer to Dublin and Cork; Dublin to Belfast and Limerick; and Cork to Limerick.

The Committee met in Dublin on November 4th, all Clubs except Limerick being represented. It was then decided to issue a full statement of the aims, constitution, and work of the Union. This has been prepared by the Secretary, and is now ready for transmission.

ACCOUNTS, 1902.

RECEIPTS.			EXPENSES.		
	£	s. d.		£	s. d.
To Balance, 1901,	. 6	10 1	W. H. Phillips, attending I.F.C.U. Committee,	. 0	9 5
Affiliation Fees—			Robt. Patterson, do.	. 0	9 5
L.F.C., 1901, .	. 1	1 2	T. Farrington, do.	. 0	14 7
C.N.F.C., 1901,	. 0	9 0	W. H. Phillips, Lectures in Dublin and Cork,	. 2	14 8
B.N.F.C., 1900-1 and 1901-2, .	. 4	4 0	J. L. Copeman, Lecture in Limerick, .	. 1	9 6
L.F.C., 1902, .	. 0	19 8	R. J. Ussher, Lecture in Belfast, .	. 1	10 5
D.N.F.C., 1901,	. 1	5 4	G. H. Carpenter, Lecture in Limerick, .	. 1	11 9
			Postage, 1901 2, .	. 0	5 2
				9	4 11
			By Balance, .	. 5	4 4
	£14	9 3		£14	9 3

Dublin, January, 1903.

R. LLOYD PRAEGER, *Hon. Sec.*

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

DECEMBER 17.—ROBERT YOUNG, J.P., in the chair. R. J. USSHER read a paper entitled "Evidence of the Caves" before a large audience. He described the deposits of stalagmite, clay, &c., found in caves, and the important evidence they yield of the past history of the fauna of the country, including primitive man. The explorations carried out in certain well-known caves, such as Kent's Cavern, were described in detail, and special attention was directed to Shandon Cave and Ballynamintra Cave, in Ireland, the deposits of which, and the interesting remains which they yielded, being fully described. Turning to the work recently carried by the Irish Cave Committee under the chairmanship of Dr. Scharff, the caves of Keishcorran were referred to, and an account given of the digging carried out there in 1901 under the superintendence of the speaker. These researches added a new animal, the Arctic Lemming, to the Irish fauna, and proved the abundance of the Bear in old days. A vote of thanks was passed on the motion of John M. Dickson, seconded by Prof. Symington.

JANUARY 6.—JOHN M. MACCORMAC, M.D., read a paper on "Heredity in its relation to the Nervous System."

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 16.—The President, F. J. BIGGER, in the chair. R. J. USSHER lectured on "Birds and their Breeding Habits." The position of nests and its relation to the colour of eggs was dealt with, and the variation in number, size, and shape of eggs was discussed. The peculiar behaviour of nesting birds and of their young was alluded to, and the relation existing between the date of nesting and external conditions, such as food supply, was emphasized. Nests are built in very different positions, such as roofs and chimneys, trees, herbage, holes and burrows, shingle, moors, marshes, cliffs, and sea-caves. The various kinds of nests which birds build include swinging nests, domed nests, fortified nests, adapted nests, floating nests; while many birds build no nest at all. The well-known parasitism of the Cuckoo was referred to.

A number of slides illustrating the life of the young Cuckoo were shown by ROBERT PATTERSON at the conclusion of the lecture, which was illustrated by a very fine series of slides, mostly by Robert Welch.

A vote of thanks was passed on the motion of WILLIAM GRAY. The PRESIDENT referred to the advantages of the Field Club Union, which aided in the securing for the Club of such a lecturer as Mr. Ussher.

BOTANICAL SECTION.—DECEMBER 19.—The study of our native ferns was continued. Mr. H. C. MARSHALL read an interesting and instructive paper on "Fern Propagation and Growth," and afterwards described a number of species, principally of the North-east district. The next meeting of the Section was announced to be held on Friday evening, 16th January.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Grey-lag Goose from Mr. R. M. Barrington, a pair of Sheldrake from Capt. Boxer, a Peacock from Lady Inglis, a Leopard from the Zoological Society of London, a Monkey from Lady M'Calmont, and a Lemur from Mrs. Skimin.

DUBLIN NATURALISTS' FIELD CLUB.

DECEMBER 6.—WINTER EXCURSION.—The first of the winter excursions which the Committee are experimentally carrying out took place. The weather was favourable—cold, but dry. A party of nineteen assembled at Terenure, at 1.30, and entered the grounds of Bushy Park (by kind permission of Sir Frederick Shaw, Bart.). D. Houston, who acted as conductor, demonstrated in botany, and G. H. Carpenter in zoology. Much of interest was seen. Among the subjects studied were climbing plants (*Clematis*, *Vicia*, *Hedera*, *Rubus*), dispersal of fruit (*Clematis*, *Crataegus*, *Geranium*, *Galium*, *Fraxinus*), galls (on *Quercus*, *Fraxinus*), rooting of tips of Bramble shoots, and shoots arising from roots (*Crataegus*). Brown withered patches occurring on the centre of Holly leaves were found by Mr. Carpenter to be caused by the maggot of the minute two-winged fly, *Chromatomyia ilicis* Curt. R. Ll. Praeger pointed out fine examples of river terraces along the Dodder. An enjoyable and instructive afternoon was spent, and the party subsequently had tea with Mrs. Praeger.

DECEMBER 8.—Prof. COLE in the chair. Thirty-two members and visitors were present. The Hon. Secretary read out the names of those proposed by the Committee as the Officers and Committee for 1903, as follows:—PRESIDENT—W. F. de V. Kane; VICE-PRESIDENT—F. W. Burbidge; HON. SECS.—G. H. Pethybridge and J. de Witt Hinch; HON. TREAS.—H. K. G. Cuthbert; COMMITTEE—Miss Knowles, Miss M'Intosh, Miss Mahaffy, Miss Massy, G. H. Carpenter, W. F. Guun, J. N. Halbert, D. Houston, D. M'Ardle, R. Ll. Praeger, H. J. Seymour, and W. B. Wright.

W. H. PHILLIPS (Field Club Union Lecturer from the Belfast Naturalists' Field Club), then read a paper entitled "A Gossip about British Ferns." The paper was illustrated by numerous prints of ferns, and also by fresh fronds. G. H. PETHYBRIDGE, D. HOUSTON, R. LL. PRAEGER, and F. O'B. ELLISON discussed the paper.

An informal account was then given by D. HOUSTON, G. H. PETHYBRIDGE, and R. LL. PRAEGER of the winter excursion held on the previous Saturday, with demonstrations on the specimens collected.

Mr. J. Adams, B.A., was elected a member of the Club.

CORK NATURALISTS' FIELD CLUB.

DECEMBER 9.—W. H. PHILLIPS, who came from the Belfast Club under the Field Club Union lecture exchange scheme, read a paper entitled "A Gossip about British Ferns." The paper was illustrated with a fine series of nature prints and fresh fronds.

NOTES.

ZOOLOGY.

Tidal Fringes.

While walking on the sea-shore, and especially on a strand, one may sometimes see, usually at high-water mark, a fringe of marine debris, largely composed of sea-weed with a few species of shells. This is generally the result of stormy weather, and experienced workers know that such debris yields, now and then, prizes when least expected. There is another class of tidal fringe, however, found along our strands, to which I desire to call attention; a fringe formed usually of one species, which comes in at the edge of a quiet sea, generally in summer or early autumn. The first of these I remember noticing was a very narrow line of the snow-white *Miliolina secans*, a porcellaneous member of the Foraminifera, that stretched all the way from Portrush to the White Rocks. This is common on some shores mixed with other species; here it was by itself. Mr. J. Wright, to whom I brought some of this fringe, tells me that Messrs. Stewart and Swanston found *Truncatulina lobatula* under similar circumstances on a strand of the Dingle promontory. On this same strand at Portrush, also on a quiet September day, I found the exquisite spiral shell of *Spirula Peronii* dotting the tide mark here and there for over a mile. The majority were much broken, but I obtained eight or ten nice specimens. I have noticed shells of this little tropical¹ Cephalopod on several other occasions at both Portrush and Portstewart, but never saw the animal. At the latter strand I have noted the Cowrie, *Trivia europæa*, coming in plentifully along the margin of a quiet tide, but in nothing like the quantity which Mr. Frank Bigger and myself once found as a thick tide-fringe on Ocean Strand near Portsalon. We brought away several thousands of the finest specimens. This is the best locality I know in Ireland for this pretty shell; for Messrs. Darbshire and Standen found it there in even larger quantities. *Hydrobia ulva* occasionally occurs as a fringe at the mouth of the Boyne, and in Belfast Lough. The violet pelagic shell, *Ianthina rotundata*, is carefully watched for on the north coast each summer and autumn. It sometimes sparingly fringes high-water-mark along Bush Bay and Ballycastle strand, and I have watched it coming in alive with its float on Finner Strand, Bundoran, during a westerly gale. On Boxing-day, 1901, along the Inner Bay of Dundrum, there was a thick fringe, in some places over an inch deep, of young specimens of the common crab *Carcinus menas*. The tide recedes far at this southern end, and it is possible a sharp frost while tide was out may have caused the death of these myriads, which the incoming tide quietly floated up later to high-water mark. The Banded Wedge-shell, *Donax vittatus*, a common bivalve

¹ Native habitats—West Indies, S.E. Asia, Australia

on many strands, mixed with some other species, I have seen as a separate fringe at Magilligan and Portstewart, and *Actæon tornatilis* at Castlerock. In May last I noticed a matted fringe of the delicate spines of the Heart Urchin, *Echinocardium cordatum*, with a few small bivalves on Trabeg, Rosapenna, and Mr. Standen informs me that he noticed the same at Portsalon Strand in May, 1893. The commoner species mentioned may be found almost anywhere round our coasts, but it is only in special stations, I think, one finds them selected out like this in large numbers. Perhaps some other readers of this Journal can add something to this list.

R. WELCH.

Belfast.

Succinea oblonga near Mallow.

On the 2nd of October last, I found a specimen of this rare shell in a field close to Mallow railway station. It was near the root on an Iris (*I. Pseud-acorus*) that was growing in some inches of water. I pulled it up when in search of *Pisidia*. It is of the southern form of Cork and Kerry, rather than of the long narrow form found so plentifully in Lough Erne in recent years. I sent the shell to Mr. R. Welch, of Belfast, for identification.

P. H. GRIERSON.

Clondalkin.

Cœcilianella acicula in Co. Waterford.

I was much interested in reading Miss Massy's note in the December issue of *Irish Naturalist* on *Cœcilianella acicula* in Co. Dublin. On November 28th, 1902, I took seven specimens, two living, the rest empty shells, about four miles from Cappoquin, near the Waterford road. They were close to the surface under small stones in a dry situation, where the formation was Lower Limestone of the Carboniferous series.

P. H. GRIERSON.

Clondalkin.

Short Sunfish in the Moy Estuary.

On the 29th of October when passing Goose Island in my shooting punt, I observed a large specimen of the Short Sunfish (*Orthogoriscus mola*) lying dead on the shore of the Island. It was a large specimen, over five feet in length, and was the first I ever knew visiting the estuary, though they are not at all uncommon in the open bay near Kilcummin Head during summer, where my friend, the late W. Litter, used frequently take them as they rolled along near the surface of the water, their dorsal fins betraying them as they appeared over the water.

ROBERT WARREN.

Moy View, Ballina.

The Harvey Collection of Irish Birds.

When at the Cork Exhibition last October, I took advantage of the opportunity of visiting the Queen's College, for I was anxious to inspect the fine collection of native birds presented to that Institution, by the late Dr. J. R. Harvey, when leaving Cork to reside with his son in Dublin. At the time of my visit the gentleman in charge of the collection was absent, but one of the under officials very civilly obtained the keys and opened the cases for me to examine some rare specimens that I had the pleasure (many years ago) of presenting to my old and valued friend.

My first view was very disappointing, from the neglected appearance of the collection, and I was grieved to see the careless manner in which the specimens were crowded and huddled together without any attempt at arrangement, so that it was difficult to find any particular specimen wanted. Especially some of the rare ones, which were partly hidden—in some instances quite so, behind the common ones, instead of being placed in the front of the cases, within view of the observer. For instance, I was a long time trying to find a specimen of the Spotted Redshank (only the *second* known to have been obtained in Ireland), and at last found it behind a Common Redshank, and other waders. Then, again, when looking for a specimen of the Iceland Gull (only the fourth known to Mr. Thompson as being shot in Ireland), I found it hidden in a corner of the case behind its dust-covered companions, Blackbacked, Herring, and Common Gulls. This state of things surprised me, for I was under the impression that, where there was a Cork Naturalists' Field Club, whose meetings you so fully report from time to time in the *Irish Naturalist*, some interest would have been taken in this (which at one time was the finest collection of native birds in the South of Ireland) if not for the love of the science, at least for respect of the memory of the generous donor, who, among Irish naturalists, ranked *second only* to Wm. Thompson. As far as I could judge from the appearance of the specimens, no attempts have been made of late years to add to the collection, and as I have no doubt that when Dr. Harvey made the presentation, it was with the intention that the collection should form the nucleus of a larger one, that ultimately would be part of a public museum, to further the study of natural history. However, this does not seem to be the view of either the College authorities, or of the Field Club.

ROBERT WARREN.

Moy View, Ballina.

Animal remains from the Gobbins Caves, Co. Antrim.

No one who has been fortunate enough to visit the wonderful Gobbins cliffs and caves near Belfast can help being interested in the animal remains which have been brought to light there. A cliff path—one of the greatest sights in the North of Ireland—is being constructed along the base of the fine basalt precipices under the able superintendence of Mr. Wise. During the progress of the work caves were discovered in which large quantities of bones were found. My attention was first drawn to them by Mr. R. Welch, who sent a selection of these animal

remains to the National Museum in Dublin. His beautifully illustrated article in the *Irish Naturalist* (vol. xi., 1902), on the Gobbins Cliffs, still remains vividly impressed on our minds, and many of us have been induced thereby to visit the magnificent cliffs, which, due to the enterprise of the Northern Counties Railway, have now been made easily accessible to the tourist.

The age of the remains found in the cave cannot be accurately determined, as the contents had been removed by the workmen before a scientific survey of the deposits had been made. But from the nature of the bones and to judge from the species they belong to, they may have been deposited within the last few centuries.

There was the greater part of the skeleton of a small Fox; the bones being uninjured. Hence it probably inhabited the cave and died a natural death there. The remainder of the bones are mostly such as might have been dragged into the cave by a Fox. The presence of the Red Deer is indicated by the occurrence of a fragment of a large antler which, at the time it met with its death, was still attached to the skull. All the Sheep remains, and there are many of all ages, are fragmentary, and had apparently been gnawed at. Then there were a few long bones of the Irish Hare, the Rabbit and Rat, and some fragments of an Ox and a Calf, and also of a Dog about the size of a shepherd's dog. The numerous bird remains have not yet been identified. They probably belong to sea-birds frequenting the coast, and which, occasionally, brought portions of their food into the cave, such as the Sea-bream, of which part of the head was discovered. Mixed up with the bones were the marine shells of *Littorina rudis*, *Helcion pellucidum*, and *Hydrobia ulvæ*, as well as a few specimens of *Hyalinia alliaria*, a species common in the district.

There is no reason to suppose that the caves were at any time inhabited by man.

R. F. SCHARFF.

¹ Dublin Museum.

GEOLOGY.

Lower Lias Reptilian remains at Belfast.

Northern readers of the *Irish Naturalist* may be interested to know that the heavy rain in September of the present year has exposed several new sections of Lower Lias rocks at Carr's Glen. This stream runs between the Cave Hill and Squire's Hill, and cuts through the Lower Lias and Upper Cretaceous rocks. The force of the mountain torrent has cleared the bed of the stream of boulders, and exposed splendid sections of Secondary rocks. In the zone of *Ammonites planorbis* (Sow.) I discerned three large vertebræ of a Reptile. This is the nearest locality to Belfast where Lower Liassic rocks are to be found.

R. BELL.

Belfast

THREE WEEKS IN SOUTH KERRY.

JUNE, 1902.

GENERAL ACCOUNT AND BOTANY.

BY FRANK BOUSKELL, F.E.S.

THE many interesting botanical problems of this district suggested to us, some years ago, an entomological trip, and in June, 1902, the party was made up of Messrs. H. St. J. Donisthorpe (Coleoptera), F. Bouskell (Coleoptera), W. J. Kaye (Lepidoptera).

A lodge was taken at Rossbeigh, near Glenbeigh, picturesquely situated on the side of the mountain on the south side of Dingle Bay, with the sea just below, and the sand-hills stretching out in front. The view from our windows was extensive—the mountainous country on the north side of the Bay stretching for miles, the Slieve Mish mountains showing up boldly, and forming a wonderful weather guide foretelling rain infallibly for our first ten days.

The country round us consisted of a series of mountain ridges of Old Red Sandstone formation, whilst the valleys or synclinals were occupied with Carboniferous limestone.

This, roughly, is the formation of the whole of South Kerry.

The country we worked is all comprised in the South Kerry district of the "Irish Topographical Botany". Similar districts might, with advantage, be adopted for entomology, and would in time prove invaluable to students of distribution.

As, out of a total of 930 square miles, over 300 square miles of this district is unreclaimed mountain and bog, and 400 square miles is under grass, only 93 square miles under crops, one would expect a larger fauna than it appears to have. Take the Coleoptera; out of the 1,630 species recorded for Ireland, only about 650 are noted for the whole of Kerry, and in the flora, where more work has probably been done than in any other district, 680 species are recorded for South Kerry.

¹ Irish Top. Bot.—Praeger. *Proc. R. I. Acad.* 3rd Series, Vol. vii., 1902.

To compare this with an English midland county, Leicestershire, where practically every inch is under cultivation, we find recorded—Coleoptera, 1,700 odd species; Flora¹, 825 Phanerogams, excluding 35 casuals. However, numbers are made up for by the interesting forms which occur, and, doubtless, when more thoroughly worked, many new species will be recorded in all orders.

Our party took all orders and a good number of plants, although botany was not worked systematically.

A number of the characteristic south-west plants were noted. *Pinguicula grandiflora* in nearly every valley. *P. lusitanica* near Caherciveen. *Saxifraga umbrosa* very abundant and variable. *S. Geum* on mountains near Caragh Lake. *Euphorbia hiberna* abundant. On the sandhills at Rossbehy we found the usual fauna and flora, including *Euphorbia Paralias* in abundance, but not the *Sphinx*, which feeds on it; and *Vicia angustifolia* var. *Bobartii*, Foster, with white flowers, in several large patches.

At Kenmare *Statice rarifolia* was found, but *Apion limonei*, which is found on *S. Limonium*, did not occur, although carefully worked for. *Silene maritima* was in the utmost abundance, producing some good moths. *Linaria vulgaris*, near the road from Caragh to Glencar, is not recorded for South Kerry.

Amongst other plants just round us we noted *Veronica officinalis*, an exceedingly pale form, almost white; *Valerianella olitoria*, var. *lasiocarpa*; *Orchis Morio*, varying from the palest pink to the deepest purple.

The weather in June was most unfavourable for collecting plants and insects; the continued cold and wet for the first fortnight almost rendered work impossible; but later, when we got a few hot days, we made up lost time. Our first week we noticed Violets, Primroses, Bluebells, Hawthorn, Foxgloves, and Dog Roses, all in bloom together, and insects were all late in appearing.

The mountain roads, when fully warmed by the sun, were most attractive to Coleoptera, but not before 11.30 to 12 o'clock. The country round Caragh Lake, Glencar, and the Macgillicuddy Reeks would well repay further work, but

¹ Flora of Leicestershire. *Trans. Leic. Lit. and Phil. Soc.*, 1886.

our time was too short to do them properly. On ascending Carrantuohill (3,414 ft.) from the Loch Acoose side, a lot of fine-looking ground was noted, but no subsequent opportunity of working it occurred.

At Caragh and in the Kenmare district the Spotted Slug of Kerry (*Geomalacus maculosus*) was found in some numbers. This interesting slug has only been recorded from this district and the west of the Iberian Peninsula.

On the whole, a most enjoyable and not unprofitable time was spent. The people were charming, and hospitality itself; always ready to do their "Saxon" visitors a kindness. On several evenings we were entertained with the characteristic country dances and many quaint stories. A number of snapshots of some of the finest scenery in the world were obtained, and will bring back many pleasant memories of three weeks in the wilds of Kerry.

COLEOPTERA.

BY HORACE ST. J. DONISTHORPE, F.Z.S., F.E.S.

THE weather was much against us, being very cold at first, and raining nearly the whole of the first fortnight, or otherwise; judging from what we saw of the neighbourhood, we might have expected to do better. We, however, managed by hard work to collect a fair number of beetles, and some of considerable interest. The two best collecting grounds we discovered near to us were the Caragh Lake Hotel end of Caragh Lake, and Glencar, the latter being an entomological paradise. One of the most noticeable features in the beetles found by us was the number of melanic and dark forms which occurred in all families, making a very interesting series—*Carabus granulatus* and *Pterostichus versicolor* in particular being often jet black.

Several specimens of *Pterostichus versicolor* and *Silpha subro-tundata* were found to be infested by an intestinal worm of the genus *Gordius*, which, in spite of its comparative length, does not, I believe, cause any injury to its host.

We captured between three and four hundred species; of these, five species are new to Ireland, forty-eight new to Kerry, of which twenty-two are new to Munster.

The species new to Ireland are as follows :—

Bembidium nigrlicorne.—Fowler writes of this species (Col. Brit. Isles, I., p. 110) “rare,” and gives the following localities—Newcastle district, Chobham, Cannock Chase, Cheshire, and Liverpool. It has not yet been found in Scotland. It is a western European insect.

Perileptus areolatus.—This interesting little species has only been taken in Lancashire, North Wales, and Scotland in the British Isles heretofore. It ranges over the middle and south of Europe, and has occurred in Norway, and it is found also in Algeria and the Caucasus district.

Elater pomonæ.—A few specimens of this very local beetle were taken at Glencar. The New Forest appears to be its only other British locality. It is widely distributed in Europe.

Cyphon pallidulus.—This species was common at Glencar in company with *C. fadi*. It is widely distributed in England, local in Scotland, and occurs in the middle and west of Europe.

Hylecoetus dermestoides.—This is another very interesting addition taken sparingly at Glencar. It has occurred at Cannock Chase, Sherwood Forest, near Manchester, and rarely in Scotland—Europe, middle and west.

The “Irish List,” so often referred to later on, is, of course, Messrs. Johnson and Halbert’s admirable “List of the Beetles of Ireland,” 1901; and we hope this will be one of many records which will go towards supplying the material from which they will be able to bring out a supplement soon.

Our thanks are due to Mr. E. A. Waterhouse for help in naming species.

Where no locality is given after a species, Rossbeigh is to be understood.

Cicindellidæ.—*Cicindela campestris* not uncommon.

Carabidæ.—*Cychrus rostratus*, remains only at Rossbeigh; one dead specimen in pool from spring near summit of Carrantuohill; *Carabus catenulatus* not common on mountains; *C. nemoralis*; *C. violaceus*.—This species is recorded as “very rare” in the Irish List; it is therefore worthy of mention that since our return the guide who conducted us up Carrantuohill has sent Mr. Bouskell a specimen from that locality.

C. clathratus in bogs and on marshy ground at the foot of Carrantuohill and other mountains; *C. granulatus* very common, many black forms being taken; *Notiophilus biguttatus*, *substriatus*, *aquaticus* and *palustris*; *Leistus spinibarbis* very rare, under stones on mountain at the back of our lodge; this species is only recorded from Antrim in the Irish List; *L. fulvibarbis*; *Nebria brevicollis*; *N. Gyllenhali* on mountains; *Blethisa multipunctata*, very rare, Sheen River; *Loricera pilicornis*; *Clivina fossor*; *Dyschirius impunctifennis*, abundant on the sandhills (in company with *Bledius arenarius*), three forms occurred—bronze, elytra red brown, and black, the two last not metallic; it is not recorded from Munster in the Irish List; *Brosicus cephalotes*; *Badister bipustulatus*; some dark; *Chlenius nigricornis*; *Acupalpus dorsalis*, a dark specimen taken at Caragh Lake, not recorded from Kerry in the Irish List; *Bradycellus collaris*, very rare, Carrantuohill (elevation 2,000 feet), not recorded from Munster in the Irish List; *Harpalus ruficornis*, *æneus*, *rubripes*, and *latus*; *Dichirotrichus pubescens*; *Anisodactylus binotatus*, v. *spurcaticornis*, Dej., five specimens on roads, etc., Glencar, the v. *spurcaticornis* is not recorded from Munster in the Irish List; *Pterostichus cupreus* not common, one violet blue specimen *cærulescens*, Fab.), Caragh Lake; *P. versicolor* common on roads, etc., a very variable series taken, many black forms and several most beautifully-coloured specimens; *P. madidus*, *niger*, and *vulgaris*; *P. strenuus*, *diligens*, and *striola*; *Amara tibialis*, *familiaris*, *lunicollis*, *ovata*, *communis*, and *plebia* black form; *Calathus cisteloides*, and *melanocephalus*; *Anchomenus angusticollis* under bark, Rossbeigh Wood, not recorded from Munster in the Irish List; *A. dorsalis*, *albipes*; *A. parumpunctatus*, a most variable series taken, both in size and colour, some very brilliant specimens among them; *A. viduus*, and v. *moestus*, one specimen of the type being quite black, Sheen River; *A. fuliginosus*; *A. gracilis*; *Olisthopus rotundatus*; *Bembidium rufescens*, *assimile*, and *lambros*; *B. nigricorne*, Sheen River—this is an addition to the Irish List; *B. atroceruleum* and *decorum*, Sheen River; *B. littorale*; *B. affine*, Sheen River, not recorded from Munster in the Irish List; *B. punctulatum*, Caragh Lake, not recorded from Kerry in the Irish List; *Perileptus areolatus*, not uncommon in the shingle of the Sheen River—this species is an addition to the Irish List; *Trechus lapidosus*, not uncommon in chinks in and under stones at the foot of the cliff at Rossbeigh, the Irish List does not record it from Munster, says "rare," and that at most of the localities given only single specimens were met with; *Patrobis assimilis* on Carrantuohill; *Dromius linearis*, and *D. quadrimaculatus*.

Haliplidæ.—*Haliplus fulvus* on sandhills.

Dytiscidæ.—*Agabus nebulosus*, *chalconotus*, and *bipustulatus*; *Colymbetes fuscus* on sandhills, not recorded from Kerry in the Irish List; *Acilius sulcatus*, on sandhills, not recorded from Kerry in the Irish List.

Gyrinidæ.—*Gyrinus natator*.

Hydrophilidæ.—*Hydrobius fuscipes*; *Philhydrus melanocephalus*; *Anacæna limbata*; *Helophorus æneipennis* and *brevipalpis*; *Sphaeridium scarabæoides*, on sandhills, several specimens with shoulder spots quite absent

(*lunatum*, Fab.); *Cercyon littoralis*, *depressus*, and *flavipes*; *Cryptopleurum atomarium*.

Staphylinidæ.—*Aleochara fuscipes*, *brevipennis*, *lanuginosa*, *succicola*, *Homalota elongatula*, *vestita*, *vicina*, *fungicola*, and *volans*; *Conosoma pubescens* and *lividum*; *Tachyporus obtusus*, v. *nitidicollis*, common; *T. formosus* swept rather freely off herbage down a chine; in the Irish List it is pointed out that the previous records of this species require confirmation; *T. solutus* and *chrysomelinus*; *T. humerosus* in moss, not recorded from Munster in the Irish List; *T. hypnorum* and *brunneus*; *Tachinus rufipes*; *Megacronus analis*, Rossbeigh under stones; *Bolitobius exoletus*, evening sweeping, not recorded from Kerry in the Irish List; *Heterothops binotata* on the sandhills, not recorded from Munster in the Irish List; *Quedius fulgidus* under dead bird; *Q. molochinus*, *tristis*, and *fuliginosus*; *Q. picipes* under stone, not recorded from Munster in the Irish List; *Creophilus maxillosus*, very common under carrion, also taken under stones at the foot of cliff feeding on sand-hoppers, some forms occurred with a large proportion of black pubescence giving them a very dark appearance, the v. *ciliaris*, Steph., was also not uncommon, and various intermediate forms were noted; *Leisotrophus murinus*; *Staphylinus pubescens*, *erythropterus*, and *cæsareus* not uncommon on roads; *Ocyopus olens*, *cupreus*, and *morio*; *Philonthus splendens*, in stercore on sandhills, not recorded from Kerry in the Irish List; *P. æneus*, *varius*, and *marginatus*; *P. umbratilis*, *cephalotes*, and *fmeterius*, Caragh Lake; *P. quisquiliarius*, Sheen River; *P. trossulus*; *Casius fucicola*, *xantholoma*, and v. *variolosus*, Sharp.; *Xantholinus glabratus*, on sandhills; *X. punctulatus* and *linearis*; *Othius fulvipennis*; *Lathrobium fulvipenne* and *brunnipes*; *L. terminatum*, type, from Caragh Lake; *L. multipunctatum*, not uncommon, not recorded from Kerry in the Irish List; *Stilicus orbiculatus* and *affinis*, *Medon propinquus*; *Pæderus fuscipes*, common; *Dianous cærulescens* under stones in stream, not recorded from Kerry in the Irish List; *Stenus junco*, and *speculator*; *S. pusillus*, several specimens, not recorded from Kerry in the Irish List; *S. brunnipes*, *picipes*, *crassus*, *impersus*, and *similis*. *Bledius spectabilis* in some numbers at Kenmare, it is not recorded from Munster in the Irish List. *Bledius arenarius* common on the sandhills, not recorded from Munster in the Irish List; *Platystethus arenarius*; *Oxytellus rugosus*, *laqueatus*, and *tetracarínatus*; *Trogophloeus bilineatus*; *Lesteva pubescens*; *Omalium rivulare*.

Pselaphidæ.—*Pselaphus Heisei*.

Silphidæ.—*Liodes humeralis*, under bark; *Choleva longula*, sweeping in wood at Rossbeigh, not recorded from Kerry in the Irish List; *Necrophorus mortuorum*, flying at Glencar, not recorded from Kerry in the Irish List; *Necrodes littoralis*, under dead calf on sandhills; *Silpha opaca*; *S. atrata*, v. *subrotundata*, common, both the black and brown forms being taken.

Histeridæ.—*Saprinus nitidulus* and *maritimus*.

Coccinellidæ.—*Coccinella decompunctata*; *C. unidecompunctata*, and the var. *confluens*, Donis., occurred in numbers on the sandhills, in a similar place to that in which the Rev. Canon Cruttwell took it in Galway—with us it was accompanied by the type. It is evidently a

regular Irish and Northern form, having been taken in Iceland, and then, as with Canon Cruttwell, not accompanied by the type. The larvæ were feeding on *Aphis* on *Lotus corniculatus*; *C. septempunctata*; *Halyzia* *xiv.*—*guttata*, and *conglobata*; *Rhizobius litura*; *Coccidula rufa*.

Nitidulidæ.—*Brachypterus pubescens* and *urtica*; *Cercus rufilabris*; *Epuræa æstiva*; *Nitidula bipustulata*, in dead bird on sanhills, not recorded from Kerry in the Irish List; *Omosita colon*, in carrion on sandhills, not recorded from Munster in the Irish List; *Meligethes æneus*.

Cucujidæ.—*Rhizophagus depressus*, sweeping in wood and under pine bark, Rossbeigh, not recorded from Munster in the Irish List.

Cryptophagidæ.—*Telmatophilus caricis*.

Byturidæ.—*Byturus tomentosus*, on flowers of mountain ash in wood at Rossbeigh.

Byrrhidæ.—*Byrrhus pilula*, common on Carrantuohill; *Cytilus varius*.

Lucanidæ.—*Sinodendron cylindricum*, remains and borings in an ash stump, Rossbeigh, not recorded from Munster in the Irish List.

Scarabæidæ.—*Onthophagus nuchicornis*, in stercore, Rossbeigh. *Aphodius fossor*, *fimetarius*, *scybalarius*, *ater*, and *rufipes*; *A. lapponum* and *depressus*, on Drunghill and Carrantuohill, the red var. of *depressus* being taken in sheep dung on the latter mountain—it has only been recorded from Ardara, in Ireland, before; *Ægialia arenaria*; *Georupes sylvaticus*, common, a very remarkable specimen was taken at Glencar—the head, thorax, scutellum, and underside blue violet; the elytra chestnut brown, with part of the shoulders and side margins shot with metallic violet, the legs partly chestnut, also with violet metallic reflexion; *Melolontha vulgaris*; *Phyllopertha horticola*, abundant, a very dark, nearly black form being taken.

Elateridæ.—*Lacon murinus*; *Cryptohypnus riparius*; *C. dermestoides*, Sheen River; *Elater miniatus*, Gorham (*pomona*, Brit. Cat.), is an addition to the Irish List, several specimens being taken at Glencar; it has only been found in the New Forest in the British Isles heretofore; *Athous niger* and *hæmorrhoidalis*, a nearly black specimen of the latter being taken; *Agriotes obscurus* and *lineatus*; *Dolopius marginatus*; *Corymbite cupreus*, common, the var. *æruuginosus*, Fab., being taken at Glencar and on Carrantuohill; *C. tessellatus*; *C. quercus* and v. *ochropterus*, Steph.

Dascillidæ.—*Dascillus cervinus*, common, the dark grey form being the more abundant; *Helodes marginata*, six species swept in chine near Rossbeigh, not recorded from Kerry in the Irish List; *Cyphon nitidulus*; *C. padi* and *pallidulus*, common, sweeping in damp spot at Glencar; the latter is an addition to the Irish List.

Telephoridæ.—*Telephorus lituratus*, a dark specimen taken under a stone at the edge of Caragh Lake; *T. bicolor* and *flavilabris*, species of the latter taken at Kenmare being quite black; *Rhagonycha fulva*, *limbata*, and *pallida*; *Malthodes marginatus*; *Malachius bipustulatus*.

Lymexylonidæ.—*Hylecæus dermestoides*, Glencar, very rare, out of birch and flying; this is a very interesting addition to the Irish List.

Cerambycidae.—*Rhagium bifasciatum*, common; *Strangalia armata*, flying at Glencar; *Grammoptera tabacicolor* and *ruficornis*, off flowers of the mountain ash—the former is not recorded from Kerry in the Irish List; *Pogonocherus dentatus*, swept off nettles at Caragh Lake, only recorded from Wexford and Dublin in the Irish List.

Bruchidae.—*Bruchus villosus*, abundant on broom, Glenbeigh.

Chrysomellidae.—*Donacia versicolore*a, Glencar; *D. impressa*, Caragh Lake, not recorded from Kerry in the Irish List; *D. simplex* and *discolor* Glencar; *D. sericca*, Caragh Lake. *Lebia septentrionis*, six specimens swept off *Lythrum* in a field near Caragh Lake; it is not recorded from Kerry in the Irish List. This insect, as pointed out by us in the *Entomologists' Record* (vol. xiv., p. 241, 1902), is not the same species as the English form with blue thorax, the latter being the true *Erichsoni*, Suffr. *L. lichenis*; *Lamprosoma concolor*, in moss, and by evening sweeping; *Chrysomela varians* and *Banksi*; *C. hyperici*, on *Hypericum* on railway bank, Glenbeigh, not recorded from Kerry in the Irish List; *Gastroidea viridula*, common on *Rumex*—a bronze form occurred at Caragh Lake and Kenmare; *G. polygona*; *Phaedon cochleariae*, *Phylloocta cavifrons*, very rare, swept off herbage at Caragh Lake; *Hydrothassa marginella*; *Prasocuris phellandrii*, Caragh and Glencar; *Lochmæa caprea* and *suturalis*; *Galeruca lineola*, some of the specimens from Caragh Lake being very large and dark, and *G. tenella*; *Adimonia tanacetii*; *Longitarsus holsaticus*, Turner's Rock, not recorded from Kerry in the Irish List; *L. picipes*, sweeping at Caragh Lake, not recorded from Kerry in the Irish List; *Haltica pusilla*, Rossbeigh; *Phyllotreta undulata* and *nemorum*; *Aphthona nonstriata*, common on Iris, one specimen of the var. *anescens*, Weise, being swept at Rossbeigh; much sweeping failed to produce more, though often tried for; this is the first record of this var. for Ireland; *Sphaeroderma testaceum*; *S. cardui*, Rossbeigh, sweeping, not recorded from Kerry in the Irish List; *Apteropoda graminis*, sweeping at Rossbeigh, not recorded from Kerry in the Irish List; *Plectroscelis concinna*; *Psylliodes chrysocephala*, Caragh Lake; *P. affinis*, Rossbeigh; *P. marcida*, abundant on *Cakile maritima* on the sandhills, not recorded from Munster in the Irish List; *Cassida flavicola*, Caragh, Glencar, and Rossbeigh; *C. equestris* and *C. viridis*.

Tenebrionidae.—*Helops striatus*.

Lagride.—*Lagria hirta*.

Melandryidae.—*Clinocara undulata*, very rare, beating birch at Glencar. Only one specimen has been recorded from Ireland (Kenmare) before.

Mordellidae.—*Anaspis frontalis*, *ruficollis*, and *maculata*.

Curculionidae.—*Rhynchites anevirens*, sweeping at Rossbeigh, one curiously coloured specimen, only recorded from Leinster in the Irish List; *Deporaus betulae*, Rossbeigh and Glencar, off birch, not recorded from Munster in the Irish List; *Apion cerdo*, Caragh Lake, sweeping; *A. hematodes*, *vicie*, and *apricans*; *A. scutellare*, Glencar; *A. violaceum*, *hydrolapathi*,

¹ Since this was written Mr. Tomlin has recorded it from Athenry, Co. Galway, where it occurred commonly. (Ent. Record, 1903, p. 18.)

humile; *Otiorrhynchus picipes* and *rugifrons*; *Strophosomus coryli*; *Exomias araneiformis*; *Sciaphilus muricatus*; *Liophlaeus nubilus*; *Phyllobius pyri*, Rossbeigh, not recorded from Munster in the Irish List; *P. argentatus*; *Barynotus obscurus* and *Schonherii*; *Alophus triquttatus*, Glencar and Rossbeigh: *Sitones griseus*, abundant on the sandhills; and *lineatus*; *Hypera punctata*; *H. rumicis*, abundant on *Rumex*, Caragh Lake and Rossbeigh; *H. polygoni* and *H. nigrirostris*; *Orchestes fagi*; *Rhamphus flavicornis*; *Dorytomus maculatus*; *D. pectoralis*, Glenbeigh; *Elleschus bipunctatus*, beating on the railway bank at Glenbeigh—this species is not recorded from Munster in the Irish List; *Gymnetron beccabungæ*, a red form swept at Glencar, not recorded from Kerry in the Irish List; *G. labilis*, swept off *Lythrum* at Caragh Lake; *Anthonomus ulmi*, Glencar; *A. rubi*, Caragh Lake, not recorded from Kerry in the Irish List; *A. comari*, Rossbeigh; *Nanophyes lythri*, on *Lythrum*, Caragh, Glencar, and Rossbeigh; *Cionus hortulanus*; *Poophagus sisymbrii*, Glenbeigh; *Ceuthorrhynchus assimilis*, *ericeæ*, and *pollinarius*; *Ceuthorrhynchidius floralis*, sweeping at Caragh, not recorded from Kerry in the Irish List; *Rhinoncus pericarpus*; *Balaninus alicivorus*.

HEMIPTERA.

BY E. SAUNDERS, F.L.S.

The Hemiptera collected by Mr. Donisthorpe and his companions, though few in number, proved of interest; two species—*Rhyparo-chromus dilatatus*, Herr Schäff, and *Dicyphus pallidicornis*, Fieb.—not previously known as Irish, being taken.

Pentatomidæ.—*Fentatoma baccarum*, Linn. *P. prasina*, Linn. *Fodisus luridus*, Fab.

Lygæidæ.—*Cymus claviculus*, Fall. *Rhyparachromus dilatatus*, H. S., not previously recorded as an Irish species. *Drymus sylvaticus*, Fab. *Scolopostethus decoratus*, Hahn. *Gastrodes ferrugineus*, Linn.

Reduviidæ.—*Nabis ferus*, Linn.

Saldidæ.—*Salda littoralis*, Linn.

Capsidæ.—*Monalocoris filicis*, Linn. *Dicyphus pallidicornis*, Fieb., a new Irish record. *Lygus pratensis*, Fab. *L. pastinacæ*, Fall.

Jassidæ.—*Bythoscopus flavicollis*, Linn. *Thamnotettix subfuscula*, Fall.

LEPIDOPTERA.

BY W. J. KAYE, F.E.S.

THE following notes and observations were made on the lepidoptera between June 6th and 30th, 1902, in Co. Kerry. The weather opened cold and wet, and lepidoptera even of the commonest species failed to put in an appearance. On 9th at Caragh Lake a nice yellow bronze-coloured *Chrysophanus phlæas* was taken, but little or nothing was moving, and odd *Cidaria corylata*, *Cidaria truncata*, and *Bapta temerata* concluded the day's work. Sugar was a failure *in toto*. Next day *Callophrys rubi* was to be seen commonly, and testified to the backwardness of the season. On 12th *Lasiommata megæra* was about, and Mr. Donisthorpe swept a larva of *Plusia chrysitis* in its last skin off nettle. On the following day at the same place another was taken in similar fashion. The two coleopterists of the party frequently came across larvæ of *Xylena monoglypha* under loose stones, and on two occasions *Maniola janira* in the larva state was found wandering over heather. Of other larvæ there were *Eupithecia pumilata* and *Larentia didymata* and *Pseudoterpna pruinata*, all on broom. The *L. didymata* hatched from 26th July to 16th August. On 16th, the tenth day of the sojourn, a *Scodonia belgiaria* female was taken on the summit of the pass known as Windy Gap, just over 1,000 ft. On the Glencar side of the pass *Hydrelia uncula* was fairly plentiful, *Haplotis fasciana* and *Pseudonothrix strigillaria* in profusion, while *Camptogramma bilineata* was present in small numbers, and unfortunately quite typical. Quite a pleasant surprise for the day was the new acquaintance with *Cænonympha typhon*. After taking *S. belgiaria* on the same morning, it was hard to know what to expect or work for. It turned out that the *C. typhon* was a precocious specimen and the *S. belgiaria* a belated one, as only single individuals of each were secured on that day. On 21st two fine *Pyralis octomaculata* were secured on the railway bank, and on 26th two more at the same place, besides a good specimen of *Gnophria rubricollis*. On 21st an excursion was made to Kenmare, where insects were found to be more for-

ward, as *Cænonympha typhon* was soon seen in some numbers, while *Melitæa aurinia*, var. *præclara*, was fully out, *Psednothrix strigillaria* was again in plenty, and odd specimens of *Phytometra ænea* and *Cyaniris argiolus* were seen. *Hapalotis fasciana* was in swarms. At dusk four leaden-coloured *Eupithecia venosata* were taken, and one of what at the time I personally had little doubt was *Dianthæcia cæsia*. The box in which it was contained was unfortunately "paraffiny," and upon closer inspection identification was impossible. On 24th, at Glencar, *Nemcophila russula* was out and in splendid condition, both sexes being secured. *Hydrelia uncula* was now over, but *Cænonympha typhon* was well out. On 28th a flying visit was made to Killarney. None of the specialties could be turned up in the short time at one's disposal, but at home at Rossbeigh, on the sandhills, insects were now beginning to emerge, and *Heliophila littoralis*, *Barathra albicolon*, *Agrotis vestigialis*, and *Xanthorrhoe galiata* came to a light provided for their benefit. *Spilosoma menthastri*, with buff-coloured forewings, was not despised, and very buff specimens of *Spilosoma lubricipida* helped to swell the feeble total. *Nudaria mundana* began to be a pest, and *Hepialus velleda* added some excitement by dashing about in front of our lodge. The few remaining insects that were secured were *Tephrosia crepuscularia* (= *biundularia*) on 14th and 17th. *Pelurga comitata*, *Spilote ulmata*, and *Boarmia repandata* at Torc, Killarney, on 28th. *Macaria notata*, *Xanthorrhoe fluctuata*, *Phyctænia fuscalis*, the last on 8th, while on the last day of the trip *Eupithecia pulchellata*, *E. vulgata*, *E. castigata*, and *E. pumilata* all come to light. The Lepidoptera were evidently beginning to show up just as we were leaving, and doubtless early July had many more insects to show than the month of June, 1902, which will be memorable for its inclemency.

HYMENOPTERA.

BY E. SAUNDERS, F.L.S., REV. F. D. MORICE, M.A., AND CLAUDE MORLEY, F.E.S.

Heterogyna.—*Formica fusca*, Linn. *Lasius niger*, Linn.—Pale race with tibiæ without exserted hairs, but much larger than ordinary *alienus*—two nests at Rossbeigh, June 8th and 12th, and at Carragh Lake, June 9th. *L. flavus*, De Geer. *Leptothorax acervorum*, Fab. *Myrmica ruginodis*, Nyl. *M. scabrinodis*, Nyl.

Fossores.—*Pompilus plumbeus*, Fab. *Crabro palmipes*, Linn. *C. dimidiatus*, Fab. *C. iv. maculatus*, Fab. *Oxybelus uniglumis*, Linn.

Anthophila.—*Halictus rubicundus*, Chr. *H. cylindricus*, Fab. *H. subfasciatus*, Nyl. *H. villosulus*, Kirb. *H. nitidiusculus*, Kirb. *H. punctatissimus*, Schk. *H. tumulorum*, Linn. *H. leucopus*, Kirb. *Andrena albicans*, Kirb. *A. minutula*, Kirb. *A. Wilkella*, Kirb. *Psithyrus quadricolor*, Lep. *Bombus hortorum*, Linn. *B. jonellus*, Sm. *B. lapidarius*, Linn.

Tenthredinidæ.—*Dolerus madidus*. *D. nigratus* (= *fissus*). *Allantus arcuatus*. *Nematus luteus*. *Tenthredopsis campestris*. *T. tilia*. *T. Coquebertii*. *Taxonus glabratus*. *Hemichroa alni*. *Strongylogaster cingulatus*. *Pachyprotasis rapæ*.

Ichneumonidæ.—*Ichneumon terminatus*, Gr. We have only previously seen this form from the New Forest. *I. gracilicornis*, Gr. female one well-marked example *Cratichneumon coruscator*, Linn., male, a most variable insect. *Melanichneumon sanguinator*, Russi, has been found in nests of *Lasius flavus*. *Hemiteles pedestris*, Fab. *Cteniscus flavilabris*, Holmgr.; the *Ctenisci* prey upon sawflies. *Pimpla instigator*, Fab., preys upon a variety of lepidopterous larvæ. *Schizopyga podagrica*, Gr., probably a local species. *Phytodietus coryphaus*, Gr. *Ischnocerus cornutus*, Ratz., parasitic on Longicornia.

DIPTERA.

[The species enumerated below have been identified by specialists in this order.—EDS. *I. Nat.*]

Pachyrrhina histrio, Fab.—Glenbeigh, June 3.

Microchrysa pollta, Linn.—Caragh Lake, June 20.

Hæmatopota crassicornis, Waith.—Glenbeigh. June 14. Glencar, June 24.

Leptis scolopacea, Linn.—Glencar, male, June 16. Glenbeigh, male, June 25.

Chrysopilus auratus, Fab.—Caragh Lake, three males, June 20.

- Bombylius canescens**, Mik.—Glenbeigh, male, June 10. Caragh Lake, female, June 17.
Tachista arrogans, Linn.—Glenbeigh, June 8.
Paragus tibialis, Fall.—Glenbeigh, June 12.
Llogaster metallina, Fab.—Glenbeigh, June 8.
Pyrophæna granditarsa, Forst.—Caragh Lake, male, June 20.
Melanostoma scalare, Fab.—Glenbeigh, female, June 23.
Sphegina clunipes, Fall.—Glenbeigh, June 8.
Rhingla campestris, Meig.—Glencar, female, June 24.
Eristalis pertinax, Scop.—Glencar, male, June 16.
Helophilus pendulus, Linn.—Caragh Lake, male, June 20.
Syritta pipiens, Linn.—Caragh Lake, June 20.
Hypoderma lineatum, Vil.—Glenbeigh, June 18.
Spilogaster protuberans, Zett.—Glenbeigh, June 25.
Orygma luctuosum, Meig.—Glenbeigh, June 8, June 10.
Loxocera aristata, Panz.—Glenbeigh, June 10.
Tetanops myopina, Fall.—Glenbeigh, June 8.
Rivellia syngenesiæ, Fab.—Caragh Lake, June 20.
Tephritis absinthii, Fab.—Glenbeigh, June 20.
Sapromyza lupulina, Fab.—Glenbeigh, June 12.
S. Inusta, Meig.—Glencar, June 16.

ARACHNIDA.

BY REV. O. PICKARD-CAMBRIDGE, M.A., F.R.S.

THE Spiders collected prove a very interesting little lot. Two species—*Tetragnatha pinicola*, L. Koch, and *Xysticus pini*, C. L. Koch, are new to Ireland, while several others have only been collected in a few localities there. The whole list is worth publishing.

Araneida.—*Prosthesima Latreillei*, Simon (female). *Clubiona reclusa*, Camb. (both sexes). *Chiracanthum carnifex*, Fab. (female). *Enoplognatha thoracica*, Hahn. (female). *Pedanostethus lividus*, Bl. (female). *Theridion sisyphium*, Cl. (female). *Linyphia pusilla*, Westr. (both sexes). *L. clathrata*, Sund. (male). *Pachygnatha Degeerii*, Sund. (both sexes). *Tetragnatha obtusa*, C. L. Koch (female). *T. extensa*, Linn. (both sexes). *T. pinicola*, L. Koch (both sexes). *T. Solandrii*, Scop. (female). *Meta segmentata*, Cl. (both sexes). *M. merianæ*, Scop. (both sexes). *Epeira cucurbitina*, Cl. (female). *E. Redii*, Scop. (females). *E. cornuta*, Cl. (both sexes). *E. diademata*, Cl. (females). *Cyclosa conica*, Pall. (both sexes). *Tibellus oblongus*, Walck. (female). *Xysticus cristatus*, Cl. (male). *X. pini*, C. L. Koch (male). *Philodromus cespitiolis*, Walck. (male). *Trochosa picta*, Hahn (both sexes). *T. leopardus*, Sund. (female). *Lycosa purbeckensis*, F. Camb. (both sexes). *L. herbigrada*, Bl. (male).

Phalangidea.—*Phalangium cornutum*, Cl.

THE IRISH FIELD CLUB UNION AND ITS WORK.

A memorandum drawn up by order of the Field Club Union Committee for circulation among the affiliated Clubs.

FOUNDATION OF THE UNION.

In July, 1894, a three-day joint excursion of the Dublin, Cork, and Limerick Field Clubs was carried out, Fermoy being the headquarters of the party. At a conference held on the evening of the second day, for the discussion of Field Club matters, emphasis was laid by J. L. Copeman, Secretary C.N.F.C., and Francis Neale, Secretary L.F.C., on the isolation of the southern Field Clubs, and on the desirability of bringing all the Irish Field Clubs into closer contact. The suggestions made on this occasion, and in subsequent discussions among the Secretaries of the Clubs represented, were not lost sight of, and after some correspondence, the following memorandum was submitted to the Committees of the Belfast, Dublin, Cork, and Limerick Field Clubs.

MEMORANDUM.

In the carrying out of the duties connected with their offices, the Secretaries of the four Irish Naturalists' Field Clubs have for some time felt the want of closer connection between the Clubs, by which more frequent meetings might be arranged, and by which the Clubs might assist each other by the occasional interchange of lecturers, and by the loan of papers, specimens, lantern slides, &c. At present the Clubs have but a slight knowledge of each other, and of each others' resources, and such aids to their work as the above-mentioned can now only be carried out after much enquiry and correspondence. With a view to facilitate these and kindred objects, the Secretaries suggest that a joint committee be formed, consisting of the President and Secretary of each Club, and that these officers be empowered by the Committee of each Club to represent them on this joint committee, their actions being in all cases subject to the approval of the Committee of their Club. The Secretaries suggest that this organization be called the Irish Field Club Union, and they feel convinced that such a bond between the Clubs will strengthen each, and greatly assist the cause of Field Club work in Ireland.

(Signed), FRANCIS JOSEPH BIGGER, Sec. B.N.F.C.
 R. LLOYD PRAEGER, Sec. D.N.F.C.
 JOHN L. COPEMAN, Sec. C.N.F.C.
 FRANCIS NEALE, Sec. L.N.F.C.

Dublin, 23. II. 94.

The following resolution was thereupon adopted by the Committee of each Club referred to :—

“Resolved : That this Committee approve of the suggestions embodied in the memorandum submitted to them by the Secretaries of the four Irish Field Clubs, and they hereby appoint the President and Secretary to represent them on the Joint Committee.”

The Irish Field Club Union Committee, thus created, appointed R. Lloyd Praeger, Secretary Dublin Field Club, as their Secretary, on the nomination of F. J. Bigger, Secretary B.N.F.C.

CONSTITUTION AND POWERS OF THE UNION COMMITTEE.

The constitution of the Union Committee rests on the memorandum and resolution quoted above. The question of the advantage of drawing up a formal constitution or code of rules of the Union has several times been raised by members of the Committee, but in each case the Committee has agreed that as every action of theirs is subject to the approval of the Committees of the affiliated Clubs, and as each member of Committee is controlled by the rules of his own Club, a separate constitution is unnecessary, and would not increase the efficiency of the organization.

It is to be observed that the appointment of representatives of each Club was done by ordinary resolution of each Club Committee. Each Committee acts independently as regards its support to the Union, both as to the appointment of representatives and the contributing to the Union funds, and each Club Committee has full power to alter one or other, or to withdraw altogether from the Union, at any time, by ordinary resolution. The Union exists only so long as each Club Committee believes that, according to the words of the original memorandum of the four Secretaries, such a bond between the Clubs strengthens each, and assists the cause of Field Club work in Ireland.

The resolution of 1895 appointed the President and Secretary of each Club as representatives on the Union Committee, and these officers have since been considered *ex-officio* members of the Committee without re-appointment. On several recent occasions, the Club Committees have appointed other Club officers or members of Committee, to represent them at meetings of the Union Committee, when the usual representatives have signified their inability

to attend the meetings in question. Nominations of this kind are clearly within the powers of each Club Committee, and have been accepted by the Union Committee.

The Secretary of the Union Committee at the time of appointment was Secretary of the D.N.F.C., and therefore a member of Committee. When he retired from the Secretaryship of that Club, he raised the question of his ability to retain the office of Union Secretary. The Committee decided that they had the power of appointing any Field Club member as their Secretary whether a member of Committee or not.

GENERAL MEETINGS.

In July, 1895, shortly after the formation of the Irish Field Club Union, a general conference and excursion was held at Galway under its auspices, the meeting lasting for seven days. This was the first occasion on which all the Naturalists' Field Clubs of Ireland met together, and was a thoroughly representative assemblage, the Belfast party numbering 46, Dublin 29, Cork 4, and Limerick 4. There were also represented the North Staffordshire Naturalists' Field Club, Nottingham Naturalists' Society, Wolverhampton Naturalists' Field Club, and Conchological Society of Great Britain and Ireland. On July 16 a conference on Field Club work was held. Since 1895, a general excursion and conference on lines similar to that at Galway has been held each third year, the date and place being selected by the Union Committee, and the arrangements made by their Secretary. The second conference was held at Kenmare in July, 1898; like that at Galway, it was numerously attended, and was productive of excellent scientific results. The third triennial conference was held in Dublin in June, 1901, and visits to the various scientific institutions of the metropolis replaced the excursions and field work of the two previous meetings. The attendance at this meeting of members, other than of the home Club, was much smaller than on previous occasions, and showed the greater popularity of field meetings as compared with scientific demonstrations. The Union Committee has provisionally selected Sligo as the centre for the fourth triennial meeting, to be held in 1904.

The proceedings and scientific results of these three general conferences have been fully reported in the *Irish Naturalist*, and occupy 82 pages of that magazine.

In addition to these triennial general meetings an attempt has been made to provide one opportunity in each intermediate year for a meeting of members of all Clubs. This has usually been done by throwing open the long excursion of the Belfast or of the Dublin Club to all, or by arranging a joint excursion of these two leading Clubs, and sending to Cork and Limerick programmes for distribution. The opportunities for intercourse between the Clubs have thus been extended.

FINANCES.

INCOME.—The Union Committee, at their first meeting (July 12, 1895), agreed to ask the Clubs for grants of money for Union expenses, and at their next meeting, on November 5 of the same year, the sum to be asked for was fixed at 2*d.* per head on the membership of each Club. This affiliation fee has been paid by the Clubs as shown underneath. The Dublin, Cork, and Limerick Clubs have calculated their contributions on the 2*d.* per head scale. The Belfast Club has given a fixed contribution of two guineas per annum; at its present membership this represents about 1½*d.* per head.

Year.	B.N.F.C.	D.N.F.C.	C.N.F.C.	L.F.C.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1895	2 2 0	1 6 4	0 5 6	0 5 10	3 19 8
1896	2 2 0	1 13 4	} 0 17 0 {	0 8 4	4 12 2
1897	2 2 0	1 9 2		0 8 4	4 8 0
1898	2 2 0	1 10 4	0 10 0	1 15 6	5 17 10
1899	2 2 0	1 11 2	0 9 0	2 0 8	6 2 10
1900	2 2 0	1 9 2	0 9 0	1 5 4	5 5 6
1901	2 2 0	1 5 4	0 9 0	1 1 2	4 17 6
1902	*	†	†	0 19 8	0 19 8
Total,	14 14 0	10 4 10	2 19 6	8 4 10	36 3 2

* Not due till April, 1903.

† Not due till January, 1903.

To this total we must add £2 12*s.* 2*d.*, credit balance from the Kenmare Conference, 1898, if we wish to obtain the total receipts of the Union.

EXPENDITURE.—The principal expenditure of Union funds has been an account of the Committee's agreement to pay the railway expenses of inter-Club lecturers and of members of Committee or Club delegates attending Committee meetings; also (since 1900) lecturers' fees (£1 1s. per lecture, 10s. 6d. for re-delivery). Postages and printing are very small items, amounting to some 30s. in eight years. The Triennial Conferences are made self-supporting so far as previous calculation will allow, the eventual profit or loss being, in the case of the last two, charged to the Union (1898, profit, £2 12s. 2d.; 1901, loss, £6 4s. 0d.). A directory of Irish naturalists was projected, and forms, &c., printed; it remains unpublished owing to the non-return by a large number of members of the forms sent out. The accounts have been submitted to the Committee annually, and since 1898 a balance sheet has been sent annually by order of the Committee to the Secretary of each Club. The Committee propose that in future a statement of accounts shall be published annually in the *Irish Naturalist*, together with a digest showing the work of the Union during the year.

The annual expenditure has been as follows:—

1895,	£2 5 1	1900,	£0 11
1896,	5 1 6	1901,	11 2 5
1897,	1 16 3	1902,	9 4 11
1898,	0 19 5		— — —
1899,	2 10 0	Total,	£33 11 0

INTERCHANGE OF LECTURERS.

One of the earliest acts of the Union Committee was to arrange for an exchange of lecturers between the affiliated Clubs, the idea being that so far as practicable one lecturer from each Club should visit each other Club each session. In practice the results obtained have diverged from this, as shown by the subjoined table. It will be seen that the number of lecturers sent out by each Club has been fairly proportionate to the number of its members available for lecturing purposes; and the number of lecturers received,

proportionate to the assistance required to supply a good lecture programme for the session.

Year.	Club sending out Lecturer.				Club receiving Lecturer.			
	Belfast.	Dublin.	Cork.	Limerick.	B.	D.	C.	L.
1895	—	Haddon, .	—	—	B.	—	—	—
	J. Wright, .	—	—	—	—	D.	C.	L.
	—	Cole, .	—	—	—	—	C.	L.
	—	Praeger, .	—	—	—	—	C.	L.
	W. Gray, .	—	—	—	—	D.	C.	L.
1896	—	Carpenter, .	—	—	B.	—	C.	L.
1897	—	Praeger, .	—	—	—	—	C.	L.
	Waddell, .	—	—	—	—	D.	—	L.
1898	—	T. Johnson, .	—	—	—	—	C.	L.
1899	—	Praeger, .	—	—	B.	—	C.	—
1900	—	Do., .	—	—	B.	—	—	—
1901	—	Seymour, .	—	—	B.	—	—	—
	—	Pethybridge, .	—	—	—	—	C.	L.
1902	W. H. Phillips, .	—	—	—	—	D.	C.	—
	—	Ussher, .	—	—	B.	—	—	—
	—	Carpenter, .	—	—	—	—	—	L.
	—	—	Copeman, .	—	—	—	—	L.

From this it will be seen that Belfast has sent out four lecturers, who delivered 10 lectures ; Dublin 8 lecturers, who delivered 20 lectures ; Cork one lecturer, who delivered one lecture ; and Limerick no lecturers. Also that Belfast has received 6 lectures, Dublin 4, Cork 10, and Limerick 11. Of late years difficulty has been experienced in procuring suitable lecturers, and this continues, although under present arrange-

ments the lecturers receive railway fare, a fee of one guinea, and entertainment at the house of a member. Increase of professional or business engagements is the reason usually assigned for this.

TRANSFER OF MEMBERSHIP.

In 1895 the Union Committee agreed to ask the Clubs so to amend their rules as to allow of a member of one Club transferring his membership to another Club without repayment of entrance fee, on production of an adequate certificate of membership. This has been done by the Club Committees, and advantage has been taken of the arrangement by members on a number of occasions.

RAILWAY FACILITIES.

Arrangements have been made with the Great Northern, Great Southern and Western, and Midland Great Western Railways, by which a member of any of the affiliated Clubs, travelling on Field Club business (*i.e.*, Field Club Union work, or scientific research not connected with his professional or business engagements), can obtain return tickets at single fare on these lines. These cheap tickets are issued on certificates signed by the Union Secretary, and countersigned by the Superintendent of the line. This concession has been of much value in Field Club work, and has been availed of, not only in connection with inter-Club visits, but in scientific researches, such as those carried on by the Royal Irish Academy Fauna and Flora Committee, and the British Association Irish Cave Committee; it has also much aided individual research. It is, of course, to be understood that this arrangement with the railway companies does not apply to short journeys.

COMMITTEE MEETINGS.

Owing to the wide dispersal of the members of the Union Committee, frequent meetings are not possible. The most convenient opportunity that presents itself is the annual conversazione of the metropolitan Club, held usually in the first week in November. The Committee has also met on the occasion of the triennial conferences.

The subjoined Table shows the dates of all Union Committee meetings, and the attendance at each :—

Year.	Date.	B.N.F.C.	D.N.F.C.	C.N.F.C.	I. F.C.	Remarks.
1895	July 2,	S.S.	P.S.	—	S.	P=President. S.=Secretary. D.=Delegate.
„	Nov. 5,	—	P.S.	S.	S.	
1896	Nov. 10,	—	P.S.	S.	—	
1897	Oct. 12,	S.	P.S.	—	S.	
1898	July 12,	S.	P.	S.	P.S.	
1899	Oct. 25,	D.D. ¹	P.S.S.	—	S.	
1900	Nov. 7,	D.	P.D.	—	—	
1901	Nov. 5,	S.S.	P.S.S.	—	—	
1902	Nov. 4,	S.D.D.	P.S.	D.	—	

¹ Requested by the Union Committee to represent the Club.

It will be seen that, of nine Committee meetings, the Dublin Club has been represented on all, Belfast on seven, Limerick on five, and Cork on four. The Secretary has attended all meetings. Seven of these Committee meetings have been held in Dublin, one in Galway, and one in Kenmare.

R. LLOYD PRAEGER,
Hon. Sec. I.F.C.U.

Dublin, December, 1902.

THE LEAF-MARKING OF ARUM MACULATUM.

BY NATHANIEL COLGAN, M.R.I.A.

THERE are few Irish field botanists who have not been impressed at one time or another with the singular infelicity of the Linnean specific name for the Common Arum. Abundant as the plant is throughout the greater part of Ireland, it is only as a rather rare exception to the general rule that it occurs with maculate leaves. One may spend day after day botanising in the county of Dublin, where the species is common over wide areas, without finding a single plant with blotched leaves, and though our few local Irish Floras are quite silent on this point, there seems to be a general agreement amongst Irish field workers that the prevalent plant in this island is one with immaculate leaves. English local Floras are apparently no more explicit than our own. I have consulted six of the best known English County Floras and found them all silent as to the marking of the Arum leaf. From this silence a prevailing congruity of the English plant, with its Linnean name, might be ingeniously deduced; but a reference to more general works is enough to throw grave doubt on the conclusion arrived at by such a convenient syllogistic method. Lightfoot's *Flora Scotica*, 1777, tells us that the Arum leaves are "often stained with dark or white spots"; Bentham's *Handbook*, 1865, says they are "sometimes spotted with purple"; Hooker's *Student's Flora*, 1884, that they are "often spotted black"; and Babington's *Manual*, 1881, that they are "green or spotted with purple." The inference to be drawn from the use of the words "often" and "sometimes" in these passages is this, that in Great Britain, as in Ireland, the Arum with immaculate leaves is the rule, with maculate leaves the exception, though an exception of more frequent occurrence than in Ireland. Personal inquiry, not very exhaustive, indeed, tends to show that in Southern Britain, at all events, maculate-leaved plants are frequent and perhaps locally abundant.

Passing from the British Isles, we find a great diversity of view amongst Continental authors on this same point. In Scandinavia, according to Hartmann, *Skandinaviens Flora*, 9th Ed., 1869, the leaves are pure green or blotched with brown ("rent grona eller braun-fläckiga"); in Germany, Willkomm, *Pflanzenreich Deutschlands*, 1882, sets them down as occasionally blotched with black ("bisweilen schwarz-gefleckt"), while Garcke, *Flora von Deutschland*, 18th Ed., 1898, describes them as self-coloured or blotched with brown ("einfarbig oder braun-gefleckt"). In France, according to Gillet et Magne, *Flore Francaise*, 1869, and Lloyd, *Flore de l'Ouest*, 5th Ed., 1897, they are "souvent tachées de noir"; Haller, in his great *Historia Stirp. Indig. Helvetiæ*, 1768, says that the leaves in Switzerland are sæpe maculata; while, not to further multiply authorities, we have old Cæsar Bauhin, in his famous *Pinax*, 1671, recording, as the result of his observations in France, Germany, and Italy, that he had usually found the *Arum* leaves immaculate, though sometimes marked with purple or blackish blotches (*Observavimus Aron vulgatum communiter nullis maculis signatum; aliquando lituris nigricantibus vel purpureis signatum*).

Whether this diversity of statement amongst Continental authors expresses anything more than diversity of opinion arising from insufficient observation, it is not easy to judge. It may be surmised, however, that the want of agreement amongst the Continental authors arises rather from a real diversity in the facts as observed in different countries and under varying conditions. Possibly some clue to the causes which produce the leaf-markings of the *Arum* might result from a study of the climatic and other conditions which obtain in areas where such markings are conspicuous either by their prevalence or their absence.

The object of these notes, however, is not so much to draw attention to the general question of the marking of the *Arum* leaf as to record the occurrence of a peculiar concomitant of that marking, observed last year in county Dublin. On the 28th March last some dozens of well blotched plants were found at Kilbogget, near Ballybrack, growing alongside a cart track in a copse, still quite leafless, and yielding free passage here and there to shafts of direct sunlight. As usual, the

markings were most irregular in shape and size, and confined to the upper surface of the leaves. But, what was quite unusual, the markings were not flat, but appeared as prominent blisters rising more or less above the general surface of the leaf, according as the markings were larger or smaller. Closer examination of these prominences showed that they were only pseudo-blisters, that is to say, they were not caused by an internal expansion of the leaf-tissue, but by a protrusion of the entire leaf substance, the prominence on the upper surface corresponding in every case most accurately with a depression on the under surface. The leaves were, in fact, *repoussees*, to borrow an expressive term from the arts. The contour of each pseudo-blisters coincided exactly with the highly irregular outline of each blotch on the leaf, and every leaf affected had every one of its blotches, from the smallest to the largest, equally defined by a prominence above and an answering depression below. No such pseudo-blisters appeared anywhere on the green or unblotched parts of the affected leaves. Only some of the maculate plants developed these blisters. Others, a short way distant from the affected plants, showed not the faintest trace of protuberance on the surface of their blotched leaves.

The aspect of these curious leaf-swellings at once suggested a morbid condition, arising, perhaps, from the attack of an insect or fungus. But no trace of either could be made out when the blotches were examined under a quarter-inch objective. Fresh specimens submitted to Mr. Greenwood Pim and to Mr. G. H. Carpenter were returned to me with a report from the former that he could find no fungoid growth, and from the latter that he saw nothing to suggest the attack of an insect.

The cause of the pseudo-blisters on the *Arum* leaf would appear then to be a mystery still awaiting solution, and the present writer can only throw out as a suggestion for future inquiry the following hypothesis. It is briefly this—that the leaf-swellings are the effect of the sun's heat acting unequally on the surface of the blotched leaves, the dark parts absorbing this heat much more actively than the green, so that the tender leaf substance is subjected to a system of strains which results in apparent blisters placed precisely in the region of

the blotches. The cause, in short, is largely physical rather than physiological, if one may venture to make such a distinction in speaking of a living organism.

On this hypothesis we should expect to find the pseudo-blisters developed chiefly where maculate Arum leaves are exposed, at least for a short time during their season of maximum development, to direct sunshine. Such conditions occur in the Kilbogget station as well as in another station in the southern part of the county, near Newcastle, where a similar state of the Arum leaf was observed in 1895. This state is not peculiar to Ireland, for my friend, the Rev. E. S. Marshall, tells me that he observed it in Bagley wood, near Oxford, before 1880, the pseudo-blisters in this case appearing on the under surface of the leaf.

The whole subject of the blotching of the Arum leaf seems well worthy of study, no less in Great Britain than in Ireland, and I would suggest to field botanists in both islands the desirability of observing and recording the relative frequency of the maculate and immaculate forms as well as the precise conditions under which each is found to occur.

Sandycove, Dublin.

NEWS GLEANINGS.

Prof. D. J. Cunningham.

Our regretful but most hearty congratulations to Prof. Cunningham, who having been appointed to the Chair of Anatomy in Edinburgh University, will shortly leave the Trinity College Medical School, which his enthusiastic teaching and valuable researches have helped to make famous. We can ill afford to lose one who combines in so remarkable and unusual a degree anatomical with zoological attainments and interest.

A Museum for Limerick.

We understand that it is proposed to establish a Municipal Museum at Limerick in connection with the Free Library. We congratulate the Corporation of that city on their enterprise, and would respectfully express our opinion that the first requisite for a successful and useful Museum is a competent curator, and that the Limerick Field Club should be able to render valuable service to their city in this connection.

Our New Editor.

We are glad to announce that henceforward we shall have the assistance of Robert Patterson, F.Z.S., M.R.I.A., in the editing of the *Irish Naturalist*. While exercising equal control with the present editors over the general conduct of the Magazine, Mr. Patterson's special department will be vertebrate zoology; he will also see to the proper reporting in our pages of the doings of the Belfast Societies, including the new Biology Association, and will keep us thoroughly in touch with the North and its many active naturalists.

Plant Communities.

We note that a popular lecture on "Plant Communities," delivered last March by Prof. J. W. Carr before the Royal Horticultural Society, and published in their *Journal*, vol. xxvii., part I., has for illustrations nine full page reproductions from the series of Irish botanical photographs, which form one of the most interesting sections of the natural history work of Mr. R. Welch.

The Dublin Club's Winter Excursions.

We note with interest that the winter excursions, which are being held by the Dublin Field Club, are proving decidedly successful. At the two held so far there has been a good turn out of members, and many interesting observations have been made. The practice of holding these excursions on the Saturday before a winter meeting, and devoting half-an-hour at such meeting to an exhibition of, and discussion on, specimens obtained on the excursion, is distinctly to be commended.

A Good Move.

The Dublin Club has also led the way in a very wise extension of the privileges conferred by membership of a Society of the kind. The new rule recently adopted, as reported on another page, reads as follows:—Students, undergraduates, and artisans may, on the recommendation of the Committee, be elected associate members in the manner prescribed for ordinary members. Associates will pay (in advance) 2s 6d. entrance fee, and 2s. 6d. annual subscription. They will have the privileges of ordinary members, except the power of voting or of acting as officers of the Club. Associates may become ordinary members by election in the usual manner, and on payment of balance of entrance fee (2s. 6d.).

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Kestrel from Mr. P. Higgins Three Jaguars, two Bactrian Camels, a pair of Black Storks, a pair of Dorsal Wallabies, and a pair of Nutcrackers have been acquired by purchase or exchange.

The Annual meeting of the Society was held on January 27th at the Royal College of Physicians. The Report for 1902 then presented by the Council was of a most encouraging nature. During the past year 197,603 visitors entered the Gardens, the Society's receipts at the gate amounting to £2,700 18s. 6d These figures show a great advance on those for 1900, the year when they reached their precisely highest standard (156,000 visitors and £2,365). The great attractions to the Gardens have been the new "Roberts" House for the large Carnivora, which was opened formally by the Lord Lieutenant on May 20th, and the arrival of the young male Giraffe—given by Butler Bey—from Khordofan. The Report contains an interesting account of the journey of this valuable animal from the Soudan to Dublin. The enterprise of the Society in facing the difficulties and risks involved in the transport of the Giraffe is most praiseworthy, and it is gratifying to know that the animal attracted so many visitors.

The stock of Lions is now the largest ever got together in the Dublin Gardens. Only a single litter of three cubs—the parents being "Prince" and "Stella"—were born during 1902, but the young animals (two males and a female) are thriving. The new "Roberts" house is eminently suitable to the animals, and the interesting experiment of keeping two lions in the outdoor cages throughout the winter has proved a marked success. These specimens have kept in excellent health, and are developing shaggy coats. The Persian Lioness, presented by the King, has markedly improved in health and condition since her arrival.

But few animals died during the year 1902. The most serious loss was that of the Ostrich, who came to a tragic end by catching and breaking his neck in the railing when quarrelling with the Cassowary in the adjoining paddock.

The Society's Photographic Medal was awarded to Mr. G. E. Low.

Sir Harry H. Johnston and Professor J. Cossar Ewart have been elected Honorary Members of the Society. With the present year some important changes in the officers of the Society take place. Lord Roberts resigns the Presidency, and is succeeded by Professor D. J. Cunningham, who is succeeded as Honorary Secretary by Dr. R. F. Scharff. Mr. Jonathan Hogg resigns his position as Honorary Treasurer, Mr. A. E. Goodbody taking that office in his stead.

DUBLIN MICROSCOPICAL CLUB.

JANUARY 14.—The Club met at Leinster House.

Dr. SCHARFF exhibited the skull of a Horse found in a bog, and demonstrated the structure of the enamel pattern seen in the molar and premolar teeth. He also pointed out the presence of the very minute loop near the inner crescent of the teeth, which was very clearly marked in this specimen, and which is absent in the teeth of the Ass. This feature is of importance in the distinction of the two species, when, as is often the case, the presence of either of them has to be established by the evidence of their teeth alone.

Mr. M'ARDLE exhibited a portion of the curious Hepatic, *Trichocolea tomentella*, Ehrhart, Dumort., which he collected in a wood near Milford, Co. Donegal, last year. It is frequently found growing in considerable patches on damp rocks and banks in woods, and near waterfalls, as at Killarney; but is nowhere common. The leaves on the main stem are distant, while those on the branches are imbricated; they are divided almost to the base into two segments, and these are again divided and sub-divided into numerous setaceous processes; the stipules are divided in a similar manner, and under the microscope the plant presents the appearance of an alga of the genus *Cladophora* or *Batrachospermum*. The perianth is fleshy, and the epidermis covered with capillary-branched hairs. In Britain it is extremely rare in fruit; but it is common in North America, where it fruit freely.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

FEBRUARY 3.—ROBERT YOUNG, Vice-President, in the chair. The following papers were read:—"The Micro-fauna of the Boulder clay, with some remarks on the movements of glaciers," by Joseph Wright, F.G.S.; and "Notes on some igneous rocks in Down and Antrim," by Mary K. Andrews. The former paper was illustrated by tables, diagrams, and lantern slides, and the latter by lantern slides, specimens, and microscopic sections.

Mr. WRIGHT, in the course of his paper, said Boulder clay was a stiff, compact clay, containing usually numerous boulders as well as smaller stones, the greater proportion of which were more or less rounded, their surface being often striated. It formed the sub-soil of the greater part of this country. It occurred at all elevations, from the sea-level to a height of upwards of 1,500 feet above the sea. Foraminifera had been found at many places in the clay. He had examined samples of it from 134 localities—from Ireland, England, Wales, Scotland, Isle of Man, Canada, and Nova Zembla—and in 105 of these foraminifera had been found. In some places they were rare; in others they were abundant; but their presence was demonstrated in three-fourths of the instances. With one or two exceptions, all the species found in the clay occurred recently off their coast, the fossil specimens having usually the lustrous

appearance of specimens brought up by the dredge. Ten of the samples were from altitudes of 500 feet and upwards, all of which with one exception, contained foraminifera. In the clay at Knock Glen, near Belfast, and Woodburn Glen, near Carrickfergus, foraminifera occurred in the greatest profusion. In one ounce of the clay from the latter place 2,000 specimens were obtained. Five of the species found at Woodburn, and three of those from the Knock, were only known as recent British forms from West of Ireland gatherings, two of them also occurring off the West coast of Scotland. Some of these West of Ireland forms had also been found in Boulder clay at other places. *Lagena fimbriata* was got at five other localities, one of them being Larch Hill, County Dublin, 650 feet above the sea; and *Polystomella subnodosa* was got at Dippel Burn, Ayrshire, at 1,061 feet elevation. The presence of these West of Ireland foraminifera in Boulder clay would lead us to infer that the clay at Knock and Woodburn was deposited when the land stood at a much lower level than now, and when the marine conditions at these places must have been somewhat similar to what now prevailed off the west coast of Ireland. Reference was made to the slow downward movement of glaciers by gravity, that when they terminated in the sea, as they frequently did in Arctic regions, they sooner or later broke off into large masses floating away as icebergs, carrying with them any stones or other material which they had accumulated in their course; that, as ice when submerged beneath the sea diminishes far more rapidly than when in air, the bergs quickly melt away, depositing their burdens over the floor of the ocean, and to this cause, as also to the action of shore ice, he largely attributed the formation of Boulder clay. The occurrence of marine organisms so generally distributed through the clay at such varied and distant localities, from the sea level to high up on mountain slopes, in his opinion gave convincing proof that this clay, in the great majority of cases, was deposited in the sea, and not on the land.

Miss ANDREWS' notes referred chiefly to the junction of granite and Silurian rock in the bed of the Glen River, Newcastle, to certain dykes on the Mourne coast, and to a few of the rhyolites of County Antrim. The paper was mostly illustrated by slides from Miss Andrews' geological photographs and microscopic sections of specimens she had collected. The dykes on the sea coasts described included the composite dyke at Glasdrumman Port, and in connection with this two slides were shown from Mr. Welch's Irish geological views, illustrating the igneous contact described by Professor Cole. The occurrence of variolite at Dunmore was shown, and, with other specimens, one was shown from the bed of the Salt-water river, the first variolite discovered in Australia. A large acid dyke in Newcastle was described, having characteristics both of the rhyolite and quartz felsite types. The connection between the Mourne granite and the Antrim rhyolites was referred to, and the rhyolite quarry at Templepatrick railway station was shown on the screen—of extreme interest on account of the evidence obtained there by Mr. MacHenry as to the age of the Antrim

rhyolites. In connection with Slemish dolerite, Miss Andrews mentioned that it was in this rock Dr. Andrews, by a magneto-chemical process, discovered native iron widely diffused in microscopic particles. In conclusion, Miss Andrews drew attention to the aid which microscopic sections give in studying the hardness and durability of rocks.

H. GULLAN, Superintendent of Works for the Corporation, made some interesting remarks on the use of Irish materials for square setts. His department, he stated, is proceeding to lay down in Corporation-street a series of pieces of square setting of different Irish rocks for the purpose of trying the wear of the rocks in question. He also mentioned that similar experiments are being carried out in connection with the macadamising of Townsend-street. The experiments, he pointed out, were likely to proceed to good results for the development of Irish quarries.

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 20.—The President (F. J. BIGGER) in the chair. W. H. PHILLIPS (Treasurer) brought forward the communication from the Irish Field Club Union which is published on a previous page. The PRESIDENT and JOHN HAMILTON spoke briefly on this communication.

R. LL. PRAEGER read a paper, entitled "Recent Progress in Irish Botany." He said that in reviewing the present state of Irish botany he referred, as was proper in a Club devoted to studies in the field, especially to systematic and to geographical botany. To take the great plant groups in order, it should be noted that little was being done in Ireland among the algæ, either marine or fresh water. The energies of their few workers at marine algæ had recently been concentrated in other directions, and a fine field remained open for the student. It was to be hoped that, in connection with the work of the proposed Belfast biological station, the seaweeds would not be lost sight of. The fresh-water algæ were even more deserted at present, but a peculiarly bright spot in the otherwise dark landscape was furnished by the recent excellent work of Mr. William West, of Bradford, upon the alga flora of Lough Neagh and Donegal. The fungi and lichens were examples of great groups which had attracted but little attention in Ireland in recent years. The lichens especially had long been in need of a champion. The mosses and hepatics were in a much more satisfactory state, and the knowledge of their distribution in Ireland was tolerably complete; but much detailed work remained to be accomplished, and many districts still awaited exploration. Northern botanists had borne their full share of the work at these interesting groups. To come finally to the flowering plants and their allies. In reviewing in detail the most recent progress, he said the date of publication of "Irish Topographical Botany" (1901) might be taken as a starting point,

Taking the forty botanical divisions of Ireland, and the estimated total flora which might be expected in each, they found that an average of 90 per cent. represented the state of their knowledge at the end of 1900. In the two years that had since elapsed that figure had, by the finding of over 250 plants new to the various counties, been increased to quite 91 per cent., a higher degree of working out than could yet be claimed for either England or Scotland. Mr. Praeger then referred in detail to the more interesting plants added to the flora of the Ulster counties during the past two years, and showed specimens.

Rev. C. H. WADDELL, R. WELCH, and the PRESIDENT made some brief remarks on the paper read. The election of two new members brought the proceedings to a close.

JANUARY 16.—BOTANICAL SECTION.—The Section met to continue the study of our native ferns. A. MILLIGAN presided, and the attention of the class was directed to various features of fern structure, particularly in relation to the terminology of the subject. A number of species were afterwards examined in detail.

DUBLIN NATURALISTS' FIELD CLUB.

JANUARY 21.—ANNUAL GENERAL MEETING.—The President (Mr. W. F. DE V. KANE, D.L.), in the chair. Twenty-nine members and visitors were present. The retiring Honorary Secretary (H. J. Seymour) read the annual report for the year 1902, while the Treasurer (H. K. G. Cuthbert) presented his annual report and balance-sheet. Both reports were unanimously adopted. The Officers and Committee for the year 1903, previously nominated, were then declared by the President duly elected, no other nominations having been received. Dr. G. H. Pethybridge and J. de W. Hinch are thus doing duty as Secretaries in the place of H. J. Seymour and W. B. Wright, while the places of the retiring members of the Committee, Miss Hensman, Dr. A. H. Foord, and Greenwood Pim are taken by Miss Knowles, D. Houston, and W. F. Gunn. Votes of thanks were passed to the outgoing officers and members of Committee, and to the Council of the Royal Irish Academy, for granting the use of the Academy House for the evening meetings of the Field Club. A new rule enabling *bona fide* students, artisans, &c., to become associate members of the Club at a reduced entrance fee and annual subscription was unanimously adopted.

The Secretary gave a *resumé* of the statement prepared by the Irish Field Club Union, which is published in full in this number of the *Irish Naturalist*. The PRESIDENT then delivered his annual address, dealing with the current opinions on the probability of the transmission of acquired characters to offspring. G. H. CARPENTER discussed the address, and proposed a vote of thanks to the President, which was carried by acclamation.

Exhibits were shown by Miss SINGLETON and Mr. PRAEGER,

NOTES.

ZOOLOGY.

Wild Swans in Donegal.

Referring to Mr. Warren's notes on above, I may mention that a flock of about a dozen swans frequented the inland water at Inch, Lough Swilly, all last summer. The flock varied in numbers from 6 to 14. I went specially to Inch to identify them and found they were Mute Swans. They were rather wild, and it was hard to get nearer them than 100 yards.

D. C. CAMPBELL.

Londonderry.

I think it highly probable that the swans seen by Mr. W. E. Hart in July were a small flock of tame swans which arrived at the "intake" water at Inch Level about the time he mentions. After a few days several of them left, but six remained, and are there still. They are all mature birds. Shortly after their arrival I examined them with a good field glass, and convinced myself that they were tame Swans. Wild Swans visit Inch in considerable numbers every winter, but do not usually appear before December.

J. R. LEEBODY.

Londonderry.

Albino Monkey in the Dublin Zoological Gardens.

Last year Captain Reeves observed in Rhodesia, near the hill on which the remains of the late Mr. Rhodes lie buried, a curious white monkey. With much trouble he succeeded in capturing it, and when he returned to Ireland he brought it back with him, and very kindly presented it to the Gardens belonging to the Royal Zoological Society of Ireland.

Although a native of South Africa, it deserves a notice in the *Irish Naturalist* as a member of the Irish introduced fauna.

The pure white fur and the red eyes show at once that this monkey is a perfect albino, scarcely a trace of colouring matter being found in the skin. Never before has an albino monkey been brought to Ireland, and it is probably for the first time that such a specimen has ever been received by any Zoological Garden.

The long tail, short front limbs, and the general contour of the monkey are those of a *Cercopithecus*. As regards the species to which it belongs, this is a more difficult matter, as the colour forms the chief distinguishing character of the thirty different kinds of monkeys grouped in this genus. But to judge from the size and general shape, and also from the locality in which the monkey was obtained, it seems to me to be a Vervet (*C. Lalandi*), which species is frequently brought to Europe from South Africa.

R. F. SCHARFF.

Dublin Museum,

WHAT IS AN ANNUAL?

BY R. LLOYD PRAEGER, B.A., M.R.I.A

I BELIEVE I am right in saying that the common conception of an annual plant is one which rises from the seed in spring, flowers and fruits during the summer and autumn, and dies as winter advances. This conception is, no doubt, confirmed by the observed behaviour of many of our favourite garden flowers; Sweet Pea, Mignonette, or *Nemophylla* we sow in or out of doors in the spring months, they brighten our gardens during the summer, and we consign to the rubbish heap their dead or dying remains before winter has settled down on us. They thus run through their life-cycle within the calendar year.

But does the calendar year mark the limits of the life of annuals in a state of nature? A little observation will convince the botanist that, in our Irish climate at least, it often does not.

Turning to botanical glossaries, we find some ambiguity in their definitions. Thus Lamarck says¹ "ANNUELLE, . . . parmi les plantes herbacées, celles qui périssent entièrement dans l'année même de leur naissance." Lindley remarks² "ANNUAL.—Flowering and fruiting in the same year in which it is raised from seed." Babington says³ "ANNUAL plants rise from the seed, flower, and die in the same year." While in the latest glossary, Daydon Jackson writes⁴ "ANNUAL, . . . within one year; used of plants which perish within that period." It is not clear in any of these quotations whether the calendar year, or a period of twelve months, is intended—apparently the former, in some cases at least.

A more correct definition of an annual would appear to be—*A plant which completes its life-cycle within twelve months.*

¹ Encyclopédie Methodique. Botanique. Tome I. 1783.

² A Glossary of technical terms used in Botany. 1848.

³ Manual of British Botany.

⁴ A Glossary of Botanic Terms 1900.

Further, as regards our own country, that twelve months very frequently extends from the autumn of one year to the autumn of the next. In any winter's walk we may find well-grown specimens of many of our annual plants, which have arisen from seed sown during the preceding autumn, and which are now weathering the winter to flower next summer, and give rise to another similar generation. In illustration whereof, I quote a few extracts from notes taken during autumn and winter rambles during the last couple of years :—

19:10:01.—Wall-top beyond Dundrum; open ground, 400 feet elevation. *Veronica arvensis*, 3 pairs of leaves. *Cerastium glomeratum*, *Festuca rigida*, *Alchemilla arvensis*, *Geranium Robertianum*, *Trifolium dubium*, well up. *Cardamine hirsuta*, well forward. *Senecio vulgaris*, all stages.

10:12:01.—Portmarnock dunes and sandy fields. *Cerastium tetrandrum*, *C. semidecandrum*, *Phleum arenarium*, all well up and abundant. In fields *Valerianella dentata*, well up. Beautiful rosettes, some very large, of *Erodium cicutarium* (one foot across); good rosettes of *Lycopsis arvensis*. Under hedges, young *Galium Aparine* (up to six inches high) and *Anthriscus vulgaris*, forming luxuriant greenery.

26:12:01.—Dundrum sand-dunes, Co. Down. *Filago minima* seedlings abundant; *Erythræa Centaureum* well forward.

10:1:02.—Rathfarnham gravel-pit. Strong young plants of *Papaver Rhæas*, *Lapsana communis*, *Bassica campestris*, *Æthusa Cynapium*.

15:11:02.—Open field near Three Rock Mountain, 500 feet. *Cardamine hirsuta*, *Fumaria* sp., *Alchemilla arvensis*, well forward.

Though I have not yet attempted to form lists of the annuals which winter in the seedling or rosette stage, instead of commencing growth in spring, it is clear that *all* annuals do not thus rise from the seed in autumn. I have sought in vain, in autumn and winter, for seedlings of the *Rhinanthaceæ*. Possibly their semi-parasitic habits so accelerate growth that there is no need of an early start. Similarly, I have not noticed autumnal seedlings of the annual *Chenopodiaceæ* or *Polygonaceæ*, such as *Atriplex*, *Suaeda*, *Salsola*, *Salicornia*, *Polygonum*; but the late fruiting of most species of these orders furnishes a good reason, which is not applicable to the *Rhinanthaceæ*. Conversely, the very early fruiting of some annuals, such as *Draba verna* and *Cardamine hirsuta*, leads one to expect that they should start in autumn, as they do. But with the bulk of the annuals, flowering in summer, there is no such necessity.

It may be noted that remarks similar to those already made apply to many biennials. For instance, *Digitalis purpurea*, *Verbascum Thapsus*, *Crepis taraxacifolia*, and, no doubt, many others, often spring up in the autumn, devote the next year to vegetative growth, and flower, fruit, and die in the third year. These plants, which are reckoned typical biennials, will not, under such circumstances, fit the usual definitions of biennials, say Babington's—"BIENNIAL plants spring from the seed in one year, flower in the following year, and then die"—unless "year" be taken to mean a period of twelve months.

Other species of limited life are in our climate quite independent of the seasons. Groundsel and Chickweed may be found as seedlings, in flower or in fruit, in any month of the twelve; but while the former appears to always complete its life-cycle within twelve months, and generally in much less, the life of the latter may extend to at least a couple of years.

Then there is a large group of plants, nominally annuals, which in a mild winter struggle through, and have two summers of flowering and fruiting; but these do not concern the points under discussion.

Can other botanists throw some light on this question, by observations from different parts of our islands? Like a certain contributor to the proceedings of the recent meeting of the British Association, I have brought the matter forward, not so much in the hope of giving, as of receiving information. In the West of Ireland I fancy the number of autumn-growing annuals is even larger than here in the East. And it would be particularly interesting to know how the same plants behave in a more continental climate—say in the South or East of England; a warmer summer and colder winter would probably greatly affect the period of growth.

Dublin.

NOTES ON SOME FOSSIL PLANTS FROM THE ARIGNA MINES.

COLLECTED BY MR. JOSEPH RYANS.

BY R. KIDSTON, F.R.S.

At the request of Prof. Cole, of the Royal College of Science, Dublin, Mr. Joseph Ryans, manager of the Arigna Mines, Co. Roscommon, sent me a collection of fossil plants from several parts of the Arigna coal-field.

The table of strata of the Arigna coal-field, given in the Memoir of the Geological Survey¹ which describes this area, is as follows :—

TABLE OF STRATA.

		Ft.	In.
Lower Coal Measures.	Fine-grained white grits,	15	0
	Shales, with marine fossils,	70	0
	Dark grey grits, with plant remains,	60	0
	Shales,	9	0
	Impure black-band ironstone,	0	4
Millstone Grit.	Middle Coal (Main Coal),	1	10
	Coal Seat, full of rootlets of <i>Stigmaria</i> ,	1	9
	Dark grey thin grits,	8	0
	Black shales,	10	0
	Thick even-bedded grits,	20	0
	Bottom or Crow Coal,	0	6
	Coal Seat, with rootlets of <i>Stigmaria</i> ,	2	0
	Thin flaggy grits,	8	0
	Splintery shales,	7	0
	Thick massive grits,	30	0
Yoredale shales,		350	0
Upper Limestone,		520	0

The seam named the *Middle Coal* in the above section is called the *Main Coal* by Mr. Ryans, and most of the fossils sent me were collected from strata associated with this seam.

¹ No. 66, 67, Memoirs of the Geological Survey. Explanatory Memoir to accompany Sheets 66 and 67 of the Maps of the Geological Survey of Ireland, illustrating part of the Counties of Sligo, Leitrim, Roscommon, and Mayo. By RICHARD J. CRUISE, M.R.I.A.; with Palæontological Notes by W. H. BAILY, F.L.S., &c. Dublin, 1878. (p. 28).

The Saltannaveeny Mine and the Aghabehy Mine are situated on separate hills, one on the north and the other on the south of the Arigna valley, but both these hills form portions of the same coal-field, now cut in two by the Arigna river.

The other localities from which fossils were sent are a quarry at Gubbarudda, and from old debris heaps also at Gubbarudda, both in the Parish of Kilronan.

A. LOCALITY.—Mine, Aghabehy, Parish of Kilronan, County Roscommon.

HORIZON.—Shale over *Main Coal*.

Lepidodendron Velthelmianum, Sternb.

1826. *Lepidodendron Veltheimii*, Sternb., Essai Flore Monde Prim., I., fasc. 4, p. 48, Pl. lii., fig. 3.
 1826. *Lepidodendron Velthelmianum*, Sternb., Essai Flore Monde Prim., I., fasc. 4, p. xii.
 1885. *Lepidodendron Velthelmianum*, Kidston (in part), Ann. Mag. Nat. Hist., Ser. 5, vol. xvi., p. 243, Pl. iii., Pl. iv., fig. 2 (not figs. 3, 4), Pl. vi., figs. II, IIIa, IIb.
 1902. *Lepidodendron Velthelmianum*, Kidston, Proc. York. Geol. and Polytech. Soc., vol. xiv. part iii., pp. 347, 381, 383, Pl. lvi. fig. i., Pl. lvii., fig. i.

Asterocalamites scrobiculatus, Schl. sp.

1820. *Calamites scrobiculatus*, Schlotheim, Petrefactenkunde, p. 402, Pl. xx., fig. 4.
 1828. *Calamites radiatus*, Brongt., Hist. de Végét. Foss., p. 122, Pl. xxvi., figs. 1-2.
 1852. *Calamites transitionis*, Göpp., Foss. Flora des Ubergangs., p. 116, Pl. iii., figs. 1-6 (? not fig. 7).
 1862. *Calamites (Asterocalamites) radiatus*, Schimper, Terr. de Trans. des Vosges, p. 321, Pl. I.
 1875. *Archeocalamites radiatus*, Stur., Culm Flora, Heft i., p. 2, Pl. i., figs. 3-8, Pl. ii., Pl. iii., Pl. iv., Pl. v., figs. 1, 2; Heft ii., p. 180 (74), Pl. ii. (xix.), figs. 1-6, Pl. iii. (xx.), figs. 1-2, Pl. iv. (xxi.), figs. 1, 1b, Pl. v. (xxii.), fig. 1.

B. LOCALITY.—Mine, Saltannaveeny, Parish of Kilronan.

HORIZON.—Shale over *Main Coal*.

Lepidodendron Velthelmianum, Sternb.

Lepidodendron Rhodeanum, Sternb.

1820. "*Schuppenpflanze*," Beitr. z. Pflanzenkunde der Vorwelt, p. 7 Pl. i., figs. 1a, 2, 3, 4.
 1826. *Lepidodendron Rhodeanum*, Sternb., Essai Flore Monde Prim. I., fasc. iv., p. xi.
 1852. *Sagenaria depressa*, Gopp., Foss. Flora des Ubergangs, p. 179, Pl. xliii., figs. 5, 6.

C. LOCALITY.—Same as B.

HORIZON.—Parting in *Main Coal*.

Stigmaria ficoides, var. **rimosa**, Goldenberg.

1862. *Stigmaria anabathra*, var. *rimosa*, Gold., Flora Saræp. Foss.,
Heft 3, p. 19, Pl. xiii., fig. 16.

D. LOCALITY.—Sandstone grit quarry, Gubbarudda, Kilronan Parish.

HORIZON.—Mr. Ryans informs me that this sandstone grit occupies a position of from 20 to 40 feet above the coal formerly worked at locality F. A seam of "Crow Coal" comes in over this quarry. and is the highest proved coal in the district.¹

Asterocalamites scrobiculatus, Schl. sp.

¹ I am informed by Mr. Ryans that this *Crow Coal* is not shown on the section of strata in the Geological Survey Memoir, but it occurs in the 60 feet of "Dark grey grits with plant remains" which the Geological Survey place at the top of their Millstone Grit. The position of the *Top Crow Coal* is from 25 to 30 feet above the *Main Coal*, its distance above the *Main Coal* varying slightly in different pits.

Mr. Ryans thinks that the section given by Sir Richard Griffith in his "Geological and Mining Survey of the Connaught Coal District in Ireland," presented to the Royal Dublin Society in 1818 and published the same year, represents more correctly the strata with which he is best acquainted. In it is also shown the position of the *Top Crow Coal*.

The following is a condensed copy of Sir Richard Griffith's section, which begins at the lowest beds :—

	Ft.	In.	Ft.	In.
1. Limestone—thickness unknown,	—	—	—	—
2. Black slate clay, with clay ironstone (average),	—	—	600	0
3. Greyish-white sandstone,	30	0 to	60	0
4. Black slate clay,	9	0 to	20	0
5. Grey sandstone,	6	0 to	10	0
6. Sandstone (Seat Rock),	1	0 to	3	0
7. Fire-clay,	1	0 to	3	0
8. Coal (<i>Bottom Crow Coal</i>),	1	0 to	3	0
9. Greyish-white sandstone,	4	0 to	20	0
10. Black slate clay,	6	0 to	15	0
11. Sandstone,	12	0 to	15	0
12. Good Coal (<i>Main Coal</i>),	2	6 to	3	4
13. Grey soft slate clay,	10	0 to	15	0
14. White sandstone,	24	0 to	45	0
15. Coal (<i>Top Crow Coal</i>),	0	8 to	0	9
16. Slate clay, with thin beds of clay ironstone,	100	0 to	200	0
17. Blackish grey sandstone,	30	0 to	60	0
18. Sandstone flag,	30	0 to	50	0

E. LOCALITY.—Debris heaps, Gubbarudda, Kilronan.

HORIZON.—?

Lepidodendron Veltheimianum, Sternb.

Lepidodendron Rhodeanum, Sternb.

Stigmaria ficoides, Sternb., sp. var.

These debris heaps are from an old disused pit on the same hill as the Aghabehy Mine, but separated from it by one or two faults.

REMARKS.—Though the number of species contained in the collection is small, they are all of species restricted to and characteristic of Lower Carboniferous rocks. In the Arigna coal-field *Lepidodendron Veltheimianum*, Sternb., is very common. *Lepidodendron Rhodeanum*, Sternb., was represented by two specimens, but it is a comparatively rare plant in Britain. Of *Asterocalamites scrobiculatus*, Schl. sp., there were about half a dozen examples. *Stigmaria ficoides* var. *rimosa*, Gold., is very rare.

All these species, with the exception of the *Stigmaria ficoides* var. *rimosa*, Gold., are common to both the Carboniferous Limestone series and the Calciferous Sandstone series, but the position of the beds from which the fossils were derived shows that the Arigna coal-field is of Yoredale Age—which is on or about the horizon of the Carboniferous Limestone series of Scotland, and probably about the position of the Edge Coal series of Scotland.

The collection contained no remains of fossil ferns, and Mr. Ryans informed me that he had not seen any.

Stirling.

THE RED-NECKED PHALAROPE IN IRELAND,
THE OUTER HEBRIDES, AND SHETLAND
AS A NESTING SPECIES,

WITH NOTES ON THE MIGRATION OF PHALAROPES

BY J. A. HARVIE-BROWN, F.R.S.E.

It is most interesting to find what may be, presumably, an extension of the breeding haunts of this species on the more direct line of its *return* migration in spring—as recorded by Mr. Williams in the *Irish Naturalist* of February, 1903, pp. 41-5.

But I do not quite understand his allusion to it as a “polar-breeding species, breeding so far south.” I have been accustomed to consider that the main line of advance *to the north* in spring was rather westerly of the Outer Hebrides, and that only a contingent of the Red-necked Phalaropes diverged somewhat to the east, to take up the considerable nesting grounds in the west of the Outer Hebrides and in Shetland. In this I may be mistaken.

But in autumn we find more records of the Grey Phalarope on the inner side of the outer isles and down the mainland coast of Scotland.

Mr. J. H. Gurney, in his paper, speaking of their surprising advent in 1886, found the greatest bulking of the records along the south coast of England; and Ussher and Barrington record almost similar *autumn* migration bulking well south on the Irish coasts in other years, notably in 1891.

Though Mr. Williams's notes refer to the west of Ireland under the Red-necked Phalarope as a *nesting* species, the migration of both the Red-necked and the Grey Phalarope is not the less (but rather the more) interesting to us Scottish recorders, and can scarcely fail also to be of interest to English ornithologists.

In time, no doubt, we will be able to pick up the links of the migration of both species; but before that can be done satisfactorily, we must learn more of the spring as well as of the autumn migration.

It is equally strange to find only two records of the Grey Phalarope in the Outer Hebrides, and those on the east side of Harris and on the east side of North Uist, as related in our last paper on the "Avifauna of the Outer Hebrides" (*Ann. Scott. Nat. Hist.*, 1903, pp. 7-21), and no other returns from any of the lighthouses.

It would prove of interest, also, if we could learn exactly how long the nesting of the Red-necked Phalarope has been known at the locality in the west of Ireland communicated to Mr. Williams. No doubt this could be done by his correspondent without giving too much publicity to collectors. We highly approve of the reticence in this direction, but exact data would be of decided value in such a case.

Judging from the data already afforded by Mr. J. H. Gurney's useful mapping of the 1886 occurrences, with regard to the Grey Phalarope, and from those supplied by Ussher and Barrington, it would appear that only in exceptionally tempestuous autumns (and possibly greatest accumulations of ice floes combined with *westerly* gales) do we observe phenomenal numbers of the Grey Phalarope. In ordinary seasons we can scarcely expect any great influx of such an Arctic-breeding species as the Grey Phalarope upon our shores, or for individuals to be driven inland at all. They are, I believe, oceanic travellers; but in extra severe weather at sea they are driven southward and eastward irresistibly, and only succeed in seeking shelter (at least in bulk) when our south Irish and English coasts are reached, thus accounting for the "lumping up of records," so to speak, on the south coasts of Ireland and England—and resting, in "an emaciated condition," before pursuing a further journey southward.

I think it would be of interest in this connection if the "ports of call" on the coasts of Ireland were tabulated for a series of years (as has been done so far both by Ussher and Barrington) *in ordinary seasons*—first in autumn, and again on their return journey, for *both* Red-necked Phalaropes and Grey Phalaropes.

I believe an extension of the breeding range of most species depends upon the normal migration lines being persistently followed *both in autumn and in spring*, and in congestion occurring not only at previous nesting centres, but also in

congestion along the double migration-lines in autumn and in spring.

I venture to throw out the hint, also, that a study of the bulking of Woodcocks in 1901-2 at the northernmost portions of the Scottish Isles (Shetland has a record year for Woodcocks in 1901-2) and all along our east coasts, to the exclusion of the west side, due to fierce south-easterly winds at the time of their migrations—fierce and of long persistency—may supply parallel data, though taking place in a diametrically opposite direction by the two species presently under treatment.

When great and phenomenal invasions of species of foreign origin take place, the greatest “bulking” occurs, first at the nearest, or *first*-reached land; and second, at their *ultima Thule*—as in the cases instanced above of the Grey Phalaropes in 1886 and 1891, and of the Woodcocks in Shetland in 1901-2. Another instance is that of the Little Auks in 1895, as recorded by Mr. Eagle Clarke, and by Mr. J. Paterson for Scottish areas. (See Map in *A. S. N. H.*, 1895).

Larbert, N.B.

REVIEWS.

AN INDEX OF ANIMALS.

Index Animalium sive Index Nominum quæ ab A.D. MDCCCLVIII. generibus et speciebus animalium imposita sunt. C. D. SHERBORN. Section I. MDCCCLVIII.-MDCCC. Pp. 1195. Cambridge: University Press, 1902. Price 25s. nett.

All working naturalists know that for ten years past Mr. C. D. Sherborn has been engaged at the British Museum, under the auspices of a Committee of the British Association, working up a great comprehensive index of animal names. The present bulky volume represents the first published instalment of his arduous task. If nearly twelve hundred pages are required for the zoological nomenclature of the eighteenth century, what will be the extent of the record for the nineteenth?

It is impossible to speak too highly of the thoroughness and accuracy with which Mr. Sherborn has done his tedious and self-denying work. The list of books consulted by him fills forty-five closely-printed pages. The index itself is arranged under species, the generic names used with any

one specific name following in alphabetical order, so that the list serves to a great extent as a generic synonymy. As Mr. Sherborn wisely remarks in his preface, "no synonymy of species is attempted; that depends on the idiosyncrasy of the systematist."

The modern craze for strict "priority" in nomenclature obliges all zoologists who do much systematic work to refer frequently to old authorities. A few minutes at this volume will save such workers hours of doubtful search in libraries, for they will see here exactly what authors have used any name, and how they have applied it. We hope that we may be able to congratulate Mr. Sherborn at some not distantly future date on the accomplishment of further instalments of this invaluable Index. The printing is excellent—so good that the pages almost look like interesting reading.

BIRD NAMES.

A Glossary of Popular, Local, and Old-fashioned Names of British Birds. By CHARLES LOUIS HETT, Author of a Dictionary of Bird Notes. London: Henry Sotheran & Co. Pp. 114. Price 1s.

Mr. Hett is to be congratulated on the success of his glossary of bird names, of which an earlier issue was reviewed in the *Irish Naturalist* for 1899. In the present edition the number of "popular, local, and old-fashioned names" is brought up to 3,000, and a great improvement has been effected by more careful arrangement. We are glad to see that all the omissions to which attention was drawn in the *Irish Naturalist* review have now been removed; and although we have no doubt that the list of local names might still be largely increased, Mr. Hett has certainly done excellent work in accumulating so large a number. We notice, however, a few which, being mere mis-spelt or mis-pronounced renderings—as "Great Awk" and "Solingtary Snipe"—were not worth including. "Heave Jar," though used by Mrs. Owen in her "Son of the Marshes" series, is so obviously "Eve-jar" with a superfluous aspirate, that we think Mr. Hett might as well have given us "Erring Gull" too. "Cuckow," which Professor Newton and some other ornithologists apparently still prefer to "Cuckoo," had a better claim to be included than the above, but is omitted. "Sand Lark" is not limited, as Mr. Hett seems to think, to the Common Sandpiper, Sanderling, and Ringed Plover; and, for that manner, a great many of the names quoted are far more miscellaneously applied than the dictionary gives us to understand. The Chough of old writers was certainly not always *Pyrrhocorax graculus*. An Irish name in common use for the Heron—"Koo-reesk"—does not seem to have found its way to the author's notice.

C. B. M.

THE LOUGH NEAGH PLANKTON.

A Contribution to the Freshwater Algæ of the North of Ireland. By W. WEST, F.L.S., and Prof. G. S. WEST, M.A., F.L.S. *Transactions of the Royal Irish Academy*, vol. xxxii., section B, part I. Pp. 100, plates I.-III. 1902. 4s.

In 1900 Mr. West was invited by the Fauna and Flora Committee to undertake an examination of the aquatic flora of Lough Neagh. Accepting this invitation, he visited the lake in May, 1900, and July, 1901. The Bann Fisheries Company kindly placed a steam launch at his disposal, which much facilitated the examination of the waters; and the results of his researches have now been issued. Excepting Mr. West's own recent paper on Freshwater Algæ of the West of Ireland¹, no so important contribution to our knowledge of the Irish freshwater flora has appeared since O'Meara's well-known Report on the Irish Diatomacæ² in 1875. The present paper enumerates 614 species, and 107 varieties and forms. Of these some 24 species are unrecorded from the British Isles, while 12 more are new to science. The main interest of Mr. West's researches lies in the fact that, apart from a short paper by Borge,³ his examination of the central portions of Lough Neagh constitutes the first attempt at the investigation of the Plankton of any of the larger British lakes. It is interesting to find that a number of species which on the European Continent are recognised as members of the Plankton-flora exclusively, are also present in the Plankton of Lough Neagh. The total Plankton-flora of Lough Neagh and its extension, Lough Beg, was found to number 92 species. These inhabitants of the open waters were much more abundant in May than in July; the author suggests that collecting carried on between August and October would probably add many interesting species to his list. One of the most striking Desmids obtained was a large *Staurostrum*, which the authors describe as *S. pelagicum*.

The algæ of Donegal being quite unknown, three weeks were devoted to the collection of material in that county in May and August, 1901, with the result of making large additions to the list already compiled. A few gatherings were also made in South Down, Louth, and Wicklow. Commenting generally on the Irish freshwater alga-flora, the authors point out the curious apparent absence of the genus *Vaucheria*, of which no species has rewarded their search in any part of Ireland; also the great rarity in the North of *Euastrum insigne*, a species of frequent occurrence in most parts of the British Isles. Three Desmids—*Micrasterias furcata*, *Staurostrum Arcticon*, and *S. longispinum*—are noted as peculiarly western in their distribution, being known in our islands only from the Snowdon range, the extreme north-west of Scotland, and in Ireland from Conne-mara and Donegal.

R. L.L. P.

¹ *Journ. Linn. Soc., Bot.*, xxix., 103-216, pl. xviii-xxiv. 1892.

² *Proc. R.I.A.* (2) II. (Science), 235-425, pl. xxvi.-xxxiv. 1875.

³ *Süsswasser-Plankton aus der Insel Mull. Botaniska Notiser*, 1897.

SOME HEMIPTERA FROM KENMARE.

BY J. E. MASON.

THE following species of Plant-bugs were collected in the neighbourhood of Kenmare during the summer of 1899. A few of the common species are omitted, as they have already been recorded in the Kenmare Conference number of the *Irish Naturalist*.¹ The seven species marked with an asterisk have not been previously recorded from Ireland.

Pentatomidæ.—*Piezodorus lituratus*, Fab., abundant in October. *Picromerus bidens*, Linn., plentiful. *Acanthosoma hæmorrhoidale*, Linn., found on hawthorn in June. *A. dentatum*, De G.

Lygæidæ.—*Gastrodes ferrugineus*, Linn.

Gerridæ.—*Gerris najas*, De G., May, Finnahy River, just out of Kenmare. *G. argentata*, Schum.

Capsidæ.—**Phytocoris dimidiatus*, Kb. *Lygus viridis*, Fall. *L. lucorum*, Mey. *L. pabulinus*, Linn., Kenmare and Valentia. *Ætorhinus angulatus* Fab. *Orthotylus tenellus*, Fall. **O. nassatus*, Fab., July. **O. prasinus*, Fall. **O. Scotti*, Reut.; this and the preceding species occurred on Elm, 23rd June. *O. ochrotrichus*, D. and S. **Phylus palliceps*, Fieb. on Oak. *Psallus ambiguus* Fall., on Crab-apple (*Pyrus Malus*). *P. betuleti*, Fall. *P. variabilis*, Fall., on Oak. **P. alnicola*, D. and S., 23rd June. *Asciodema obsoletum*, D. and S., Kenmare and Valentia. **A. Fieberi*, D. and S., 6th July.

Corixidæ.—*Corixa sahlbergi*, Fieb., and *C. moesta*, Fieb., Cloonee Lakes.

Lincoln.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Diana Monkey from Capt. J. Bunbury Eames, a Chameleon from Mr. W. A. V. Findlater, a Proteus from Mr. P. J. Donnelly, a Sparrowhawk from Mr. F. A. S. Boyd, a pair of Meerkats from Col. S. Hickson, three White Java Doves from Miss Stein, and a Magpie from Mr. W. W. Despard. A pair of Red-throated Divers, a Three-toed Sloth, a Racoon and a Porcupine have been purchased.

The Council have passed a warm resolution of congratulation to their President, Prof. D. J. Cunningham, on his appointment to the Chair of Anatomy in the University of Edinburgh.

¹ *Irish Naturalist*, vol. vii., 1898, pp. 216-217.

DUBLIN MICROSCOPICAL CLUB.

FEBRUARY 11.—The Club met at Leinster House.

Mr. MOORE exhibited sections of the floral leaves of a very fine variety of *Masdevallia Veitchiana*, an orchid which is found growing at high elevations in the Peruvian Andes. The ground colour is bright orange, due to the presence of chromoplastids in the cells immediately under the epidermis, and over part of the flower there is a brilliant sheen, due to the presence of very minute bright crimson papillæ with liquid contents. The effect is very striking.

Mr. G. H. CARPENTER showed a mandible of the springtail *Isotoma viridis* dissected out of the head, and the two mandibles of the bristle-tail *Machilis maritima* in their natural positions, with the attached muscles.

BELFAST NATURALISTS' FIELD CLUB.

FEBRUARY 17.—The President (F. J. BIGGER) in the chair. NEVIN H. FOSTER read a paper on "Rambles among and about the Mourne Mountains." He said the Mourne Mountains form the most elevated land in Ulster. They are principally composed of a rough grey granite which has thrust itself through the older series of the Ordovician and Silurian strata. Signs of severe glaciation are observable in many places. Perched blocks in many places attest the carrying power of ice. About these mountains are to be observed some birds which are not usually to be seen in the cultivated lowlands. Here the Peregrine annually rears its brood; Ring Ousels and Water Ousels are seen in fair numbers, and on some of the lower slopes the Whinchat and Nightjar are observed. Kestrels are plentiful, and on one occasion eight were seen together, hovering over the mountain side on the look-out for food. It has become an axiom with gamekeepers to destroy every bird bearing a resemblance to a Hawk, even Owls—birds which, like the Kestrel, subsist on mice, frogs, and beetles—sharing the same fate, while in the game interest they should be protected.

The paper was illustrated by thirty-five lantern slides, most of which were from photos by R. Welch. At the conclusion, remarks and criticisms were made by Messrs. CUNNINGHAM, DICKSON, WELCH, and GRAY.

The PRESIDENT brought before the meeting the desirability of all the members of the Field Club joining and becoming members of the Ulster Fisheries and Biology Association. This new Society proposed to follow out a programme that is quite in harmony with the work of the Field Club.

BOTANICAL SECTION.—FEBRUARY 13.—The Botanical Section met on Friday, February 13, to continue the study of the ferns of the North-east district. Under the leadership of Mr. W. Porter a very profitable evening was spent.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

MARCH 3.—The President (JOHN BROWN, F.R.S.) in the chair. Rev. W. S. GREEN, M.A., delivered a lecture on "The Armada Wrecks on the Irish Coast," illustrated by lantern slides.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 7.—WINTER EXCURSION.—In spite of a very stormy morning eleven members turned up at Amiens-street. The 1.55 train was taken to Sutton, whence the party, with W. B. Wright as conductor, proceeded along the shore to the Coastguard station. The old shore line and some very perfect glacial striæ were pointed out by the conductor. From the Coastguard station the party turned inland to Barren Hill, from which the tram was taken round the head. In a cutting near the summit a basalt dyke was seen penetrating the slates. D. Houston demonstrated in zoology and botany. The party reached Dublin at 5.30.

FEBRUARY 10.—The Vice-President (F. W. BURBIDGE) in the chair. Forty-one members and visitors were present. F. O'B. ELLISON read a paper on "Queer Leaves," which was illustrated by a large number of lantern slides. A short discussion, in which W. B. WRIGHT, G. H. PETHYBRIDGE, and F. W. BURBIDGE took part, followed. Exhibits by H. J. SEYMOUR and W. B. WRIGHT were unavoidably postponed. J. DE W. HINCH announced the finding of shells in Glacial beds two miles further up the Liffey valley than had hitherto been recorded. Various objects of interest found on the winter excursion held on the previous Saturday were exhibited, which showed that there was no lack either of material for study or of enthusiastic workers at this time of the year. A. ROYCROFT exhibited a number of Primrose plants in full bloom from Skerries, and W. DADE a series of freshwater Polyzoa and young Trout newly hatched, under the microscope. Six nominations for membership were announced.

MARCH 7.—WINTER EXCURSION.—The third winter excursion was to Balrothery, the object being mainly to study the esker which runs between the valleys of the Dodder and the Liffey. In spite of rather frequent hail squalls the party, numbering nineteen, spent a most enjoyable and instructive afternoon, the success of which was largely due to Mr. MacHenry of the Geological Survey, whose assistance in pointing out the various features of interest in the esker and its gravels was invaluable.

MARCH 10.—R. LL. PRAEGER in the chair. Forty-three members and visitors were present. C. B. MOFFAT read a paper on the "Spring Rivalries of Birds." Mr. Moffat argued, adducing illustrations, that the male birds compete less for particular females than for the possession of

suitable plots of ground; that this competition keeps down the number of nests and limits the birth rate.

This paper will be published in an early number of the *Irish Naturalist*. A short discussion followed, but it is much to be regretted that the ornithologists of the Club and indeed the zoologists as a whole were conspicuous by their absence from the meeting.

J. ADAMS exhibited the fruit of a South American palm which had been picked up on the shore at Howth. Owing to its high specific gravity it could not have reached these shores by means of ocean currents.

T. CROOK gave a short account of the chief features of the excursion held on the previous Saturday. G. H. PETHYBRIDGE exhibited spotted leaves of *Arum maculatum* found on the same excursion, together with sections through the spots shown under the microscope. A short paper on this subject may be expected in a future number of the *Irish Naturalist*.

Professor J. Wilson, M.A., B.Sc. and J. Clarke were elected members, and M. J. van Steenberghe and F. J. C. Skeffington, M.A., were proposed for membership of the Club. The meeting then resolved into conversazione to examine the various exhibits.

NEWS GLEANINGS.

The Belfast Biological Station.

Under the somewhat imposing and not very euphonious title of "The Ulster Fisheries and Biology Association," Prof. Gregg Wilson's scheme for a Belfast biological station has been launched. We most warmly welcome the movement, under whatever name, and are glad to give the following particulars, which have been sent out to persons likely to interest themselves in the undertaking.

PROGRAMME OF INVESTIGATIONS.

It is proposed from the first to carry on work both in the sea and in Lough Neagh. The marine work will include:—(a) Study of the distribution of local species of plants and animals. (b) Inquiry into the habits and life-histories of some of our food-fishes and of the organisms on which they live. (c) Observations on the chemical and physical characters of the sea-water. The work at the fresh-water loughs will likewise embrace:—(a) Determination of species; migration, &c. (b) Study of life-histories of fishes and organisms forming the food of fishes. (c) Physical and chemical observations.

The Honorary Director will undertake the general supervision of the work of the staff of the Association—both paid and voluntary—and will distribute such material as may be collected to members and associates and others for detailed examination and report.

EQUIPMENT AND ITS PROBABLE COST.

In order to carry on the investigations mentioned above, it will be necessary to establish a marine laboratory, and to purchase a boat, dredges, tow-nets, &c. If systematic observations are to be carried on at regular and frequent intervals, it will also be absolutely necessary to secure the entire services of an efficient scientific assistant and of a boatman. The following is a rough estimate of the outlay needed to meet these requirements:—(a) Rent or purchase of cottage for use as a Marine Laboratory, and fitting up of same, £70. (b) Purchase of steam-launch, dredges, apparatus, &c., £250. (c) Salaries of skilled assistant and boatman, £200 per annum. (d) Incidental expenses: chemicals, bottles, books, &c., £100 per annum.

The Association will consist of life members, annual members, and associates. Any person contributing £10 or upwards to the Association will be eligible for election as a life member; annual members will pay £1 per annum; associates, 10s.

The affairs of the Association will be managed by a council elected annually, and consisting of twelve members of the Association, of whom six are to be elected by the members and associates of the Association, two by the Queen's College, Belfast, two by the Belfast Natural History and Philosophical Society, and two by the Belfast Naturalists' Field Club.

Within the last month much progress has been made. Nearly £500 has been subscribed locally, a steam-launch has been purchased, a small cottage has been taken at Larne Harbour, Co. Antrim, and has been turned into a working laboratory, a resident naturalist has been appointed (Mr. Pearson, from Professor Herdman's Laboratory, Liverpool), and systematic work was begun towards the end of March. We are glad to learn that the Department of Agriculture and Technical Instruction has expressed approval of the new Association, and has arranged to make use of its scientific staff in certain fishery investigations.

Royal Irish Academicians.

The third annual election of members under the new rules took place on March 16. There were ten candidates, and all were recommended by the Council, and elected by the Academy. Natural Science is represented among the new members by G. H. Carpenter and Prof. Gregg Wilson, and Physical Science by W. E. Adeney, Prof. Hugh Ryan, and Prof. W. E. Thrift. The other new members are—Rev. Wm. Carrigan, Dr. Conolly Norman, Rev. C. F. K. Pooler, R. A. P. Rogers, and J. H. Wardell. The new members of Council elected on the same occasion include George Coffey, Prof. John Joly, R. Lloyd Praeger, and R. F. Scharff.

NOTES.

FORGERS OF NATURE'S SIGNATURE.

A few years ago we commented (*J.N.*, vi., 82. 1896) on a case of deliberate introduction of a rare Irish butterfly into a new locality, which was liable to cause confusion in the study of the native distribution of the species, and was on that account to be deplored. A large number of bushes of the two native species of Buckthorn, *Rhamnus catharticus* and *R. Frangula*, were imported from Chester and planted at Greenfield, Co. Tipperary; and 250 *Gonepteryx rhamni*, likewise from England, were turned out on them. The introducer communicated an account of his operations to the *Entomologist* (xxix., 363. 1896). The opening sentence of his note runs as follows:—"I believe I am right in saying that this butterfly does not occur in Ireland, neither do either kinds of buckthorn." Though the meaning of this sentence is somewhat obscured by peculiarities of grammar, it clearly indicates a remarkable ignorance on the writer's part of both the fauna and the flora of this country. This, we believe, is at the root of the proceeding on which we comment. Had Capt. Bagwell-Purefoy been aware of the remarkable restricted range of *G. rhamni* in Ireland, extending along the west coast, from Kerry to Mayo, and of the interest which the working out of this range has given, and is giving to Irish entomologists, we feel sure that his sportsman's instinct would have rebelled against any proceeding tending to falsify the record, or throw dust in the eyes of his fellow-naturalists. But unfortunately the mischief is done: and still in ignorance, no doubt, of the true bearings of the case, the proprietor of this new Pandora's box gives a further and fuller account, in the *Entomologist* for December last, of his alien colony and of its progress. From this it appears that, returning after five years' foreign service, he finds *G. rhamni* still flourishing on the introduced Buckthorns, so that for over ten years this foreign colony has continued. When we remember that its food-plants, the two species of *Rhamnus*, both grow wild in Capt. Bagwell-Purefoy's own county, and in many places in the West of Ireland, which is the portion of the country which this butterfly naturally affects, it will be seen that, as regards faunistic studies, the capture of specimens of *G. rhamni* can no longer be received in evidence. Tares have been sown with the crop, and, unfortunately, by no process can they be separated from it. For evermore the suspicion of introduction will hover over all records of this interesting inhabitant of our island.

Let us not be misunderstood. Our remarks refer to the introduction of animals—or plants—either known to occur, or likely to occur, in the area into which they are introduced. Attempts to naturalize many foreign animals or plants, though not to be commended from the naturalist's point of view, are fraught with no so serious consequences—though, in face of such examples as the Rabbit in Australia, and the

Sweet Briar in New Zealand, the fable of the woodman and the snake ought not to be forgotten. Captain Bagwell-Purefoy in his recent article describes attempts to substitute exotic species of *Rhamnus* for the native kinds, and to naturalize the south European *Gonepteryx cleopatra* on both native and foreign Buckthorns. These experiments, if conducted on scientific lines, are interesting, and will not easily lead to confusion, especially if the facts be made public. But against introductions such as that of *G. rhamni* in Tipperary, or, to quote an equally flagrant recent example, the Tawny Owl in Co. Down, we enter our strongest protest.

The need of a protest on this subject is further shown by an editorial paragraph in *Nature* (Dec. 18, 1902, p. 158), where a short account of Capt. Bagwell-Purefoy's introductions is given without a word of reprobation. Perhaps this is not to be wondered at when the writer of the paragraph implies that the Buckthorns are not native in Tipperary, and indulges in the alarmingly inaccurate statement that the Brimstone Butterfly "is found at Killarney and has been reported from Wicklow, but is not a native of any other part of Ireland." We deeply regret that our leading scientific magazine should thus make light of falsifications of the geographical record, and should then, as we know to be the case, refuse to insert a temperately worded protest from that naturalist who has done more than any other in recent years to unravel the mysteries of Irish distribution. We suppose this is another instance of how ignorance and the practice and toleration of introduction go together.

THE EDITORS.

BOTANY.

Riccia glaucescens Carr. in Ireland.

At page 18 of the present volume of the *Irish Naturalist*, is a notice of the hepatic *Riccia glaucescens* Carr. found by Mr. M'Ardle, September, 1902, in county Donegal, being shown to the Dublin Microscopical Club as "not previously reported from Ireland," and "an interesting addition to the Irish cryptogamic flora." But it has been already recorded from county Antrim, in the *Journal of Botany* for September, 1895, and in the *Irish Naturalist* for October, 1895, and I have in my herbarium the original specimens which are referred to in these records.

H. W. LETT.

Loughbrickland.

Lesser Dodder in Wicklow.

From the *International Catalogue of Scientific Literature*, Botany, 1901, we get a reference to *Nature Notes*, 1901, p. 198, where will be found a record of *Cuscuta Epithymum* from the Dargle, Co. Wicklow.

The Leaf-marking of *Arum maculatum*.

With reference to Mr. Colgan's remarks on this subject, the only places I have noticed the spotted form were at Dunsandle, in south-east Galway, where it grew in a situation where the sun never reached it, and could not have had a hand in heating or blistering the leaves; and quite recently in Bushy Park, Terenure—one spotted clump among many unspotted—in a place exposed to direct sunlight while the trees are still leafless. The leaves in both cases were quite smooth—not raised at the blotches. My wife tells me that the spotted form is the common one in the Schleswig woods, and that she never noticed the "pseudoblisters" there. The leaves of the Lesser Celendine frequently bear purplish blotches similar to those of the *Arum*, and often pale blotches also; and the Sit-fast has sometimes leaves with blackish markings. I have not observed, in any of these cases, a connection between the lighting and the presence of blotches. The Bloody Dock furnishes an instance comparable to that of *Arum*, of a plant the leaves of which in Ireland very seldom develop the character from which the species derives its name.

R. LLOYD PRAEGER.

Dublin.

Juncus tenuis in Co. Down.

Mr. S. A. Stewart authorizes me to state that he has found *Juncus tenuis* in Co. Down. The specimens were collected in August, 1899, on the south side of Belfast Harbour, and put aside for future examination. He hopes to work out its distribution during the coming season.

Dublin.

R. LLOYD PRAEGER.

Alpine Botanists in Kerry.

Rev. David Paul, LL.D., has contributed to the *Transactions* of the Botanical Society of Edinburgh for 1902 a ten-page account of the visit of the Scottish Alpine Botanical Club to Kerry in 1901. The party had the advantage of the guidance of Dr. Scully and Mr. Colgan, and appear to have seen most of the good plants of the district—though, curiously, we observe no single alpine species in the narrative or in the list.

ZOOLOGY.

Beetles in the Broth.

From a brew of mutton broth, recently produced at our own table, my wife and I collected a number of specimens of a small weevil, which Mr. Halbert identifies as *Calandra granaria*, L., well known for its ravages in granaries. The species has been previously taken in Dublin, in 1854 and 1855, as noted in Johnson and Halbert's list. It is sometimes immensely abundant in flour. In this instance it came in barley, purchased from a grocer in Rathgar.

Dublin.

R. LLOYD PRAEGER.

Entomological Notes on the Season.

The past season has been anything but a good one for insects. The prevalence of cold winds and damp weather operated most unfavourably for collecting, and insects have been decidedly scarce. Lepidoptera, as might be expected, were badly represented. *Vanessa urticae* was, as usual, early on the wing, appearing on April 9th; "whites" were not as numerous as usual, but the larvæ of *P. brassicae* made a great attack on the leaves of swede turnips in one of my fields, not, however, in such numbers as to cause any real damage; *Pararge egeria* was about the most abundant butterfly here; I saw a few *Vanessa atalanta*, and on August 12th, captured a single *Argynnis paphia* in my garden, being the first I had seen here; on September 26th, I took a nice specimen of *Vanessa cardui*, on a road about a quarter of a mile from this. On the same day, I got a larva of *Smerinthus populi*, feeding on sallow on the same road as I took *V. cardui* on. It had two rows of crimson spots on either side, one at the spiracles, and the other on the subdorsal region; this variety of the larva, Mr. Barrett remarks, is frequent in North Britain, having been often noticed in Roxburghshire. By hunting the flowers of Ragweed at dusk I took *Tapinostola fulva*, but sugar has been a failure; on no night were there a dozen moths out—the most plentiful *Miselia oxyacanthæ*.

Bees and wasps have been very little in evidence, indeed. Of the latter I hardly saw any till September. I notice them still (October) active at the pine trees. When cutting hay I generally find a good many nests of *Bombus*, but this year I only saw two. I, for the first time, however, met with *Psithyrus*, having taken a specimen of *P. barbutellus* floating in the canal near Newry.

Of Coleoptera I managed to make one or two good captures; but except on the few days of sunshine they were like other insects conspicuous by their absence. I took several *Cilea silphoides* crawling in a cart in which manure was carried, and a couple of *Hister cadaverinus* on a manure heap. These occurred in May, and in the same month I beat *Lochmæa cratægi* from Hawthorn. In August, I took a single specimen of *Antherophagus pallens* sitting on a thistle flower in one of my fields. I could not find any others on any of the flowers in the vicinity, nor could I find the nest of a *Bombus* anywhere about, so possibly the beetle had been conveyed there by a bee as Canon Fowler notes (*Brit. Col.*, vol. iii, p. 312), that a *Bombus* was taken by Mr. Hold with *Antherophagus nigricornis* firmly fixed by the mandibles to one of the bee's legs. On June 28th, I went with the Belfast Naturalists' Field Club to Newry, and took a *Donacia* on water plants in the canal, which proved to be *D. clavipes*, F., of which this is the first record for Ulster. I also obtained a number of *Hyphydrus ovatus*, which was quite common in the canal just outside the town.

Lough Shark is a small lake just on the borders of Co. Down, but mostly in that county. I had tried the shore once or twice before, but had met with nothing of interest. In April last, however, I tried a different part, and had the pleasure of taking *Pelophila borealis*, this being the first actual instance of its occurrence in Co. Down, as Haliday's "Near Belfast" most probably refers to the Antrim shore of Lough

Neagh. I also obtained in the same locality *Elaphrus riparius*, *E. cupreus*, *Chlanius nigricornis*, *Bembidium Mannerheimii*, *Philonthus quisquiliarius* var. *dimidiatus*, *Galerucella nymphææ*, *Lilodactylus leucogaster*, *Bağous glabriorstris* Herbst, there on the shore and on water plants; while in the water were *Cælabius v.-lineatus*, *Noterus clavicornis*, *N. sparsus*, *Philydrus testaceus*, &c. The wet weather kept the lake unusually full, and thus prevented the formation of a shore which would have been productive.

I had occasion to go up to my hayloft one day last month (September), and my attention was immediately attracted to the window, which was covered with insects. On examining it I found that the most of these were beetles, among them being the following:—*Stenus similis*, *Typhæa fumata*, *Enicmus transversus* (this was the most numerous species), *Monotoma picipes*, *Coninomus nodifer*, *Apion subulatum*, *Hypera punctata*, *Ceuthorrhynchidius troglodytes*, and a few *Corticaria elongata*. The spiders were having a fine feast on these beetles, and the remains of some moths showed that they too had fallen victims to their nimble foes. Collectors should examine the windows and walls of haylofts soon after the hay is brought in, and the bottoms of the carts that have been carrying hay just after the load has been emptied. The same applies to corn. The numbers that will be found are astonishing. Of course most of them will be common species, but there is always the chance of a good thing, and I cordially recommend this method to my brethren of the net.

W. F. JOHNSON.

Poyntzpass.

A new Irish Vertigo.

IN September, 1901, I turned up a live specimen of a *Vertigo* near Ballintoy, Co. Antrim, which did not seem referable to any species at present on the list, though it bore some resemblance in colour and texture to *V. pygmaea*, in form to *V. alpestris*. Dr. Scharff kindly examined the specimen, and pronounced it to belong to a variety of *V. alpestris* resembling that described by Clessin as *V. heldi*, and his opinion is confirmed by Dr. Boettger, of Frankfurt (Main), after careful comparison with a specimen *ex auct.* The latter considers *V. heldi* as a sub-species of *alpestris*. Certainly its resemblance to *pygmaea* is more or less superficial, and its affinities lie with *alpestris*, but I think few conchologists over here would hesitate to pronounce it a distinct species if they saw it side by side with a typical *alpestris*. *V. heldi* has a whorl more, and altogether larger dimensions, a reddish-brown colour, feebler dentition, and a differently shaped mouth, the outer margin of which slopes very obliquely from right to left.

It is a rare species on the Continent, and has only hitherto been found in the rejectamenta of two or three German rivers, though its true habitat, no doubt, is strictly alpine. It was originally described by Clessin in the *Nachr.-Bl. Mal. Ges.*, 1877, p. 49.

B. TOMLIN.

Estyn, Chester.

Merlin on Colin Mountain.

One day last spring Mr. Ewart and his keeper were having a walk over Colin when a hawk rose close to them. They marked the place and, on getting up to it, found the nest of a Merlin (*Falco aesalon*) with four young birds. The male was soon after shot, but I am glad to say the female got off. The young birds only lived for about three weeks in captivity with Mr. Sheals, the taxidermist here. He very seldom gets Merlins to stuff, Peregrines being much more common about this district.

W. H. WORKMAN.

Windsor, Belfast.

Rough-legged Buzzard in Tyrone.

A beautiful bird of this species (*Buteo lagopus*) was recently shot on the property of Col. Knox Browne, near Fivemiletown. The bird was a female, weighed 2 lb. 2 oz., and measured in extent across wings 4ft. 4in., beak to tail 21 in. It was seen striking at a hen pheasant, and was shot a few days afterwards.

E. WILLIAMS.

Dublin.

Hawfinches in Co. Kildare.

In addition to the facts given by Mr. Burbidge relating to Hawfinches, old and young, having been observed in the nesting season in Straffan House demesne, Mr. Bedford states that every year since 1896 he has noticed a few pairs of those birds in the demesne all through the nesting season, and that in winter larger numbers appear.

J. E. PALMER.

Dublin.

Hoopoe in Co. Wexford.

A specimen of the Hoopoe (*Upupa epops*) was obtained in the vicinity of New Ross, on the 7th October; it is rather an unusual time of year for this species, the majority of occurrences taking place on their spring migration, and notably in the Co. Wexford.

E. WILLIAMS.

Dublin.

Ruff at Inch, Lough Swilly.

On September last Mr. John M'Connell sent me a female Ruff, *Machetes pugnax*, Linn., which he shot on Burt Slob, Inch. This is the third record I have had from Inch.

D. C. CAMPBELL.

Londonderry.

A Winter Corncrake near Lough Swilly.

On January 3rd I examined a corncrake, *Crex pratensis*, Bech., shot a few days before at Newtowncunningham, Lough Swilly.

D. C. CAMPBELL.

Londonderry.

Black-tailed Godwit in the Moy Estuary.

When down the Moyne channel on the 29th November I saw a specimen of the Black-tailed Godwit among a lot of the common Bar-tailed. I was unable to shoot it, for after rising it was out of shot before I recognised it by its white back and black-tipped tail. It is a bird of very irregular appearance in this part of Ireland, and I have never observed more than a pair at a time, but more generally single birds. I first met this bird in March, 1859, near the island of Bauuros off Bartragh, and recognised it by the white bar on its secondaries, white back, and black-tipped tail feathers. In May, 1863, a bird in nearly full summer plumage was shot by Mr. Howley on the tidal part of the river near Belleek Manor. Early in November, 1876, I shot a specimen in winter plumage near Bauuros, and by the same shot picked up 13 Lapwings, 13 Redshanks, and a Bar-tailed Godwit. On the 29th of June, 1878, I observed a pair in their handsome summer plumage on the lands near Partragh, but failed in obtaining them. On the 3rd of September, 1881, a bird in the immature plumage of the year was shot near Roserk Abbey by the late Mr. W. Jackson. The foregoing are all the notes of occurrence that I have been able to obtain in this locality, which show the very irregular visits of this species.

ROBERT WARREN.

Moy View, Ballina.

Glossy Ibis in Ireland.

There seems to have been a visitation of this species (*Plegidus falcinellus*) during October—one was obtained at Lahinch, Co. Clare, and has been purchased for the Irish collection in the Museum. Another was taken near Broadway, Co. Wexford, and I have heard of another Wexford specimen. It is many years since this bird has occurred in Ireland, and, as in these instances, generally in the immature plumage.

E. WILLIAMS.

Dublin.

Eider Duck at Malahide.

An Eider Duck (*Somateria mollissima*) was shot in Malahide estuary in November, by Mr. Wellington. The specimen is a young male of the year. This duck is very rare on the Dublin coast, having occurred in very few instances, and never in the fully adult dress.

E. WILLIAMS.

Dublin.

NOTES ON THE KERRY FLORA, 1902.

BY REGINALD W. SCULLY, F.L.S.

A FEW days spent last summer by my friends, the Rev. E. S. Marshall and Dr. Shoolbred, at Cloghane, in the Dingle peninsula, and a fortnight by myself in North Kerry, resulted in the finding of several interesting plants. Unfortunately, almost continuous rain at Cloghane practically put an end to mountain work on the Brandon range, the chief object of my friends' visit to this remote spot. The Rev. E. S. Marshall has kindly placed a marked "London Catalogue" at my disposal, from which I have abstracted the more interesting among the plants they observed. In the following list the records taken from the above are followed by the initials *M.S.*, my own initial being added—*M.S. & S.*—where the plants were found by us when working together. Records without initials are my own. Additions to District I. of "*Cybele Hibernica*," 2nd Edition, are indicated, as usual, by "1," while those followed by "1" or "2" are additions to the Kerry sub-divisions of "*Irish Topographical Botany*."

- Ranunculus Drouetii**, Godr.—1. Coast marshes about Fermoy, near Cloghane, Kerry S.; and near Tralee, Kerry N: *M.S.*
 var. **Godronii** (Gren.).—Near Cloghane, with the type: *M.S.*
- R. heterophyllus**,—Web. *ex p.* 1. 2. Pond near Lerrig, north of Ardfert, Kerry N.; the only Kerry locality known to me.
- R. Baudotii**, Godr.—Pond near Lerrig, with the above, three miles from the nearest sea. Though common round the coast, this is the only inland station I know of for this plant in the county.
- Fumaria purpurea**, Pugsley.—1. 1. Hedge banks, Castlegregory, Kerry S., 1888; and *M.S.*, 1902. 2. Castletlough Bay, Killarney: *M.S. & S.*; and near Ballyheigue, Kerry N.
- F. Boræi**, Jord.—Near Ballymalis Castle, Kerry N., 1888.
- F. confusa**, Jord.—About Brandon village and Stradbally, Kerry S.: *M.S.* Shores of Castletlough Bay, Killarney: *M.S. & S.* Spa and Fenit, Tralee Bay, 1888; and about Banna, Kerry N.

Mr. H. W. Pugsley, who kindly looked over a parcel of Capreolate Fumatories for me, and named specimens from the above localities, has reserved a form which differs from any described by him in his "*British Capreolate Fumatories*," *Journ. of Bot.*, 1902, pp. 129-173, for future com-

parison and identification. It has been gathered by *M.S.* and myself in several parts of Kerry, and a similar plant has, I learn, been also gathered by Mr. Colgan in Co. Dublin.

Arabis cillata, R. Br. and var. ***hispida***, Syme.—Abundant on sand-hills near Castlegregory: *M.S.*

Cochlearia danica, Linn.—2. Sparingly about the Spa, Tralee, Kerry N.

****Diplotaxis muralis***, DC.—2. Sparingly by roadside near Ballyheigue, Kerry N.

****Dianthus plumarius***, Linn.—Castlelough ruins, Killarney; an alien relic: *M.S.* & *S.*

Arenaria serpyllifolia, Linn., d. ***Lloydii*** (Jord.).—Near Cloghane, Stradbally, &c., Kerry S.; and near Tralee, Kerry N.: *M.S.*

Rubus pulcherrimus, Neum.—1. About Brandon village, Cloghane, &c., Kerry S.; *M.S.*

R. villicaulis, Koehl. var. ***Selmeri***, Lindeb.—Killarney, Kerry N.: *M.S.*

R. Iricus, Rogers.—1. Castlegregory, Kerry S.: *M.S.*

R. argentatus, P. J. Muell.—1. 2. Muckcross, Killarney, Kerry N., 1888.

R. pyramidalis, Kalt.—1. 1. Stradbally, &c., near Castlegregory, Kerry S.: *M.S.*

R. mutabilis, Genev.—Muckcross, Killarney, Kerry N., 1888.

R. cœslus* × *rusticanus.—Kilfenora, Fenit, Kerry N., 1889.

The above *Rubi* have been named for me either by the Rev. W. Moyle Rogers or Rev. F. S. Marshall.

Potentilla procumbens, Sibth.—1. Beaufort, Kerry S., and several other localities in S. and N. Kerry. Found also by *M.S.* about Castlegregory, &c., Kerry S.

P. procumbens* × *Tormentilla.—Dinas, Killarney, Kerry N.: *M.S.* & *S.*

Saxifraga grœnlandica, Linn. ?—A densely-tufted form, gathered by *M.S.* on Brandon, and by Mr. Colgan and myself on Beeown Mountain the previous year, seems best referred here.

Callitriche obtusangula, Le Gall.—1. About Stradbally, Castlegregory, &c., Kerry S.: *M.S.* Lerrig pond, &c., Kerry N.

Scandix Pecten-Veneris, Linn.—Castlegregory, Kerry S.: *M.S.*; Lixnaw, Kerry N.

****Valerianella carinata***, Loisel.—1. 2. Abundant on roadside walls and banks near Ballyheigue, Kerry N.

****Matricaria discolor***, DC.—1. 2. Plentiful about a gate-way and adjoining field-side, rather more than a mile west of Beale Point, Kerry N. The plant which occurs here is *M. occidentalis*, Green, a form already noticed by Mr. Colgan in Co. Dublin, and recorded in 'Ir. Nat.," 1894, p. 215. This erect, large-headed plant seems well worthy of sub-specific rank. In the above station, the first on record for Kerry, this interesting alien reaches the southern limit of its range in Ireland as at present known.

***Crepis biennis**, Linn.—I. 2. Abundant in a meadow near the Spa, Tralee, Kerry N.

Taraxacum officinale, Web., var. **udum** (Jord.).—Cloghane, Stradbally; Gap of Dnnloe, Kerry S: *M.S.*

Centunculus minimus, Linn.—2. Side of small pool west of Ballylongford, Kerry N.; the only locality known to me in the north of the county.

Chlora perfoliata, Linn.—Abundant in some sandy fields near Moneycashen, River Cashen, Kerry N.; the second Kerry locality.

***Cuscuta Trifolii**, Bab.—I. Abundant over a considerable area of sandy pasture between Trench Bridge and Castlegregory, Kerry S.: *M.S.* & *S.* I have never seen this plant so abundant as here; the dense circular patches, several yards in diameter, catching the eye from a considerable distance. It was certainly not here a few years ago, when I walked over these sandy fields without seeing a trace of the plant now so plentiful and conspicuous.

Euphrasia Rostkoviana, Hayne.—Near the Mines, Ross Island, Killarney: *M.S.* & *S.*

Pinguicula vulgaris, Linn.—Descends to sea level about Fermoy, Castlegregory, &c., Kerry S.: *M.S.* & *S.* Rare, and usually montane in Kerry.

Plantago Coronopus, Linn., var. **ceratophyllum**, Rapin.—About Fermoy and Stradbally, Kerry S.: *M.S.*

***Elodea canadensis**, Michx.—Ditches about River Cashen and River Brick, Kerry N.; very rare in the county.

Orchis incarnata, Linn.—About Brandon, Cloghane, Castlegregory, &c., Kerry S.; and Ardagh bog, &c., Kerry N.: *M.S.* & *S.*

O. latifolia, Linn.—I. 1 and 2. With the above, and seems to be the more plentiful in Kerry.

Mr. F. F. Linton's sub-species *O. ericetorum* also occurred in most of the above localities: *M.S.*

Ophrys apifera, Huds.—I. 2. Sparingly on Beale sandhills, Kerry N.; the only locality known to me in the county.

Sisyrinchium angustifolium, Mill.—Boggy shore of Upper Lake, Killarney, flooded in winter; looking native: *M.S.* & *S.*

I also visited a locality about a mile and a half north of Castlemaine, where the plant had been found some two or three years previously by Sir William Godfrey, of Kilcolman Abbey. I found the *Sisyrinchium* growing here in great abundance over a large wet pasture field, and sparingly in one or two fields adjoining. I may mention that a tuft of the plant was taken by the finder from this locality, and planted in the Kilcolman flower-beds; it will be interesting to watch its behaviour here.

Potamogeton plantagineus, Du Croz.—2. Roadside bog-ditch between Sleveen and River Brick, Kerry N.; the only Kerry locality known to me.

Eleocharis uniglumis, Reichb.—Coast marshes at Fermoy, near Cloghane, Kerry S.: *M.S.*

- Carex muricata**, Linn.—Limestone hills near Rahoneen, Ardfert, Kerry N.
- Glyceria pilcata**, Fries., var. **declinata** (Bréb.).—About Cloghane and Stradbally, Kerry S.; and near Tralee, Kerry N.: *M.S.*
- Festuca rubra**, Linn., var. **fallax** (Thuill.).—Cloghane, Castlegregory, &c., Kerry S.: *M.S.* About Castlclough Bay, Killarney, Beaufort, &c., Kerry N.
- ***Bromus secalinus**, Linn.—2. Near Moneycashen, River Cashen, Kerry N.
- B. racemosus**, Linn.—1. About Cloghane, Castlegregory, &c., Kerry S.: *M.S.* Blennerville, &c., Kerry N.
- ***B. commutatus**, Schrad.—2. Abundant in a sown grass field near L. Ardagh, Killarney, Kerry N.: *M.S.* & *S.*
- Equisetum trachyodon**, Braun.—2. By the River Laune, below Ballymalis Castle, Kerry N.
- Chara polyacantha**, Braun.—1. 2. Roadside bog-ditch between Sleveen and River Brick, Kerry N.
- C. vulgaris**, Linn., var. **papillata**, Wallr.—Ditch near the sea, west of Tralee, Kerry N.: *M.S.*
- Tolypella glomerata**, Leonh.—1. 2. Pool near Banna sandhills, Ardfert, Kerry N.

My thanks are due to the Revs. E. S. Marshall and W. Moyle Rogers, Messrs. Groves, Pugsley, and Colgan, for their kindness in looking over various doubtful plants.

Dublin.

OBITUARY.

Alfred Vaughan Jennings.

We regret to announce the death of this talented London naturalist, whose work in Dublin, in connection with the Royal College of Science and National Museum, from 1895 to 1898, will not soon be forgotten. He passed away at Christiania, on January 11th, in his 39th year. Only eighteen years ago he was bracketed first with Martin F. Woodward in Huxley's advanced zoology class at South Kensington, and it is sad to think that both these brilliant students are no longer with us. Jennings was a most enthusiastic teacher, and he possessed an all-round knowledge of the natural sciences that is rare in these days of excessive specialization.

A GEOLOGICAL RENAISSANCE.¹

BY PROF. G. A. J. COLE, F.G.S.

THE revised edition of part of the well-known "Memoir to Sheets 102 and 112," of which a second edition appeared in 1875, is virtually a new work. Sheet 102 is omitted from its scope, and yet it contains 160 pages against the 76 of the previous Memoir. Despite the general principle, at present adopted by the Survey, of interfering as little as possible with the descriptions of the "solid" geology, a number of wise changes have been made in the text, and the path has been opened for a systematic revision of the district. The detailed investigation of the "drift" deposits naturally occupies a large part of the Memoir; and the new edition of Sheet 112 appears at the same time, and at once replaces the "solid" map that went before it. By the use of colour-printing, the Ordnance Survey Office in Phoenix Park has found it possible to issue this map at only 6*d.* more than the price of the ordinary uncoloured topographical sheet. The contoured edition of that sheet, issued in 1900, has been used as a basis; and the system of colours and stipplings selected by the geologists interferes very little with its clearness. The promontory of Howth has, in fact, presented the only serious difficulty, and a plain colour might with advantage be substituted for the remarkable pattern formed by the triple series of green lines, sprinkled with red and yellow confetti, which at present adorns the shales.

The detail of the map is extraordinary, and provides a picture of the succession of surface-deposits round Dublin throughout post-Pliocene times. The map and memoir together will become classical, not only as a record of facts already known, but as abounding in original contributions to Irish

¹ (i) **Geological Survey of Ireland, Sheet 112, Drift Edition.** Dublin, 1902 (actually 1903). Price 1*s.* 6*d.*

(ii) **The Geology of the Country around Dublin** (Explanation of Sheet 112 of the Geological Survey of Ireland). By G. W. Lamplugh, J. R. Kilroe, A. M'Henry, H. J. Seymour, and W. B. Wright. Dublin, 1903. Price 3*s.*

geology. That the distinguished District-Geologist and his limited staff have accomplished so much in a complex district in the limits of a single year is strong testimony to the efficiency of the Survey, acting under the stimulus of high ideals. In work such as this, the question is one of accurately recording what is seen on the surface of the ground ; but the geological map must not be merely petrographic, like that of an economic soil-survey. It must convey to the mind the conclusions of those who have every right to form a judgment ; it must correlate certain deposits, and divide others on grounds of differences in age or conditions of formation. In this case, the map and its marginal index serve almost as a text-book ; to confirm or criticise the conclusions expressed by it, we may take up the accompanying Memoir and sally forth to the localities indicated in its pages.

Let us take the map, however, for a moment by itself. One of the most striking features is the mass of drift, sand and gravel, limestone, boulder-clay, and non-calcareous clay, banked against the mountains in the south. The deposits run high up into the pre-glacial hollows ; later downwash from the slopes has crept over some of them, and a sprinkling of granite boulders rests on others. The sands and gravels of glacial mounds and eskers are, on structural grounds, distinguished from those intercalated in boulder-clay ; the deposits below Tibbradden are of the former character, while those of Killiney cliff are of the latter. We then trace the action of rivers on the general coating of the country ; the terrace-gravels of the Liffey, the Dodder, and the Rockbrook streams, are clearly marked out in colour. Here at Willbrook is an expansion due to early flooding ; in other places, notably along the grassy flats of the Liffey, recent alluvial infilling has tended to fill up the floor between the terraces. Here, again, the Dodder is still cutting a little gorge, and limestone appears along its course near Milltown ; while at Donnybrook it emerges on its delta, which, as the stippling informs us, has been raised in fairly recent times above the sea. The modern intake between the Custom House in Dublin and the sea is separately indicated, outside the shore-line of 1673. An island is shown as having existed at that date, in place of the now continuous sand-banks of Clontarf. A still more modern

feature is the exposure of granite through the drift along the lines of railway near Dundrum and Kingstown. No one who has ever used this map will wish to revert to the older and somewhat conjectural "solid" one. When so much is conveyed by the correct representation of deposits that were once scorned as "superficial," it becomes questionable if "solid" maps should be published at all, except on a reduced scale for the purpose of illustrating general structure. All available dips appear, of course, on the drift map, which thus becomes the one sound work of reference for geological and economic enquiries alike.

The complete mapping of the drift in Ireland cannot, however, be contemplated by the Survey, unless its forces are largely increased. The number of workers allotted to Ireland is probably as large as is at present reasonable in view of the demands of England, where several districts are being resurveyed, and of Scotland, where large areas of difficult structure have yet to be examined. The present plan, we understand, for Ireland is to issue drift maps of the country round important towns. Belfast has already been surveyed for this purpose, and Cork follows in the present season. These maps will serve as useful types of what might be done with a larger scientific staff. Meanwhile, a number of problems of geological structure, of modern palæontology, and of petrography, must perforce be laid aside in Ireland.

Yet the new Memoir on the Dublin area shows how much light may be thrown on debatable questions throughout the country by a searching study of one particular district. So far, the work is encouraging in the highest degree; and the association of the whole staff, by means of initialed paragraphs, in the production of the Memoir, promotes a sense of responsibility, and cannot fail to stimulate observation. This practice has prevailed in previous publications; but the District-Geologist has gone far in the present instance to encourage individual research, and has even admitted certain revolutionary speculations (pp. 7 and 8), on the principle that free discussion is the surest path to truth.

Mr. M'Henry's suggestion that the Howth and Bray series is younger than the shales that flank the Leinster granite, and that the whole constitutes one sequence of Upper Silurian age,

is probably the most remarkable feature of the notes on "solid" geology. *Oldhamia* itself, now known from several parts of the world, is so typically a Cambrian organism that the argument should, it seems to us, have been turned round the other way. Frankly, there is so far not a shred of evidence for regarding these beds as Upper Silurian, although such strata might reasonably be expected in the chain. If Mr. M'Henry's reading of the sequence is correct, the so-called Lower Silurians are most probably not Upper Silurian, but Lower Cambrian. Mr. Lamplugh's wise comparison of the system of rocks here displayed with the Skiddaw Slate (p. 8), points out the lines on which research must now go forward. In any case, the supposed unconformity between the Bray series and the "Lower Silurian" is at present made of no account. Here is a point that shows how much scope there is for revision of a wide area, if such work can ever again be undertaken.

Mr. Lamplugh introduces several interesting and trenchant paragraphs into the account of the Carboniferous Limestone, notably in regard to "knoll-structure" (pp. 9 and 78). Mr. Seymour's contributions to petrography (pp. 21-27) are similarly welcome, and owe scarcely anything to the previous edition of the Memoir. We notice that he uses "Lower Silurian" freely for the shales, while in some other sections the term has been cautiously excised.

Mr. Lamplugh then gives "a general account of the glacial and post-glacial deposits" (pp. 36-54), to which readers on both sides of the Irish Sea will turn. The terms used for the divisions of the drift are clearly explained, and attention is called to the "dry gaps," such as the Dingle, as having had a glacial origin. We are glad to note (p. 40) that the classification of the drift as Lower Boulder Clay, Middle Sand and Gravel, and Upper Boulder Clay, is no longer maintained, except as a purely local feature. Strong evidence is adduced to prove that the famous shell-bearing gravels have been placed in their present positions by glacier-ice; and a coincident epoch of submergence is not admitted. This argument is elaborated later (pp. 114-115) in the case of the Kill-of-the-Grange clay, but is distinctly weakened by the suggestion that the materials of that formation, including

northern erratics, were originally deposited, side by side with the shells, by icebergs in an open sea. What is admissible at the opening of the glacial epoch is 'found to be inadmissible later, because an extension of the sea, rather than an extension of the land-ice, would be required. The Kill clay, then, was deposited under marine conditions in the floor of an Irish sea of much the same dimensions as the present one, and must therefore have been fished up and moved into its present position by solid ice, because there is no evidence of any extension of the sea. When we find it candidly admitted that the general trend of the striæ formed by the great ice-sheet at the epoch of maximum glaciation does not support this supposition of the inflow of ice from the Irish Sea, we are led to ask whether the arguments from the Kill area cannot be used in an exactly opposite direction. Why is the presence of northern erratics (p. 47) fatal to a marine origin for the shelly beds in general, when they are admissible and satisfactory in the case of Kill? No one will now deny, least of all after Mr. Lamplugh's enlightening survey, that solid ice banked itself against the Leinster Chain, and that its burden of detritus became ultimately mingled with all the previous drifts. But, in view of the great earth-movements postulated by continental glacialists for Scandinavia and the northern seas, we feel inclined to ask why Ireland shared in none of these. If we are told that the shelly deposits are only found along the coast, we can provisionally accept this assertion, and erect in imagination a barrier of inland ice, which acted as a margin to the temporary extension of the sea. The extreme lucidity and fairness of Mr. Lamplugh's statements makes us very willing to accept them. The foregoing remarks are chiefly prompted by the extreme reluctance of British glacialists to believe in even moderate earth-movements since the close of Pliocene times. Seeing that the whole Wealden arch was formed and denuded since the deposition of the Lenham Beds, and that the Irish Sea has widened and shrunk again conspicuously in post-glacial days, we think that this view of the permanence of levels throughout our islands in a particular epoch is, to say the least, illogical. This was the epoch, moreover, that saw the destruction of a north-western continent, the consolidation of the Alpine core, and the birth of Italy from Mediterranean waves.

The great difference that formerly existed in the views of geologists as to the general mode of origin of the drifts in the British Isles has, however, practically disappeared. The discovery of the nature of eskers—or, rather, the belated recognition of what Holst, Hummel, and Goodchild had written on the subject—was the last blow to those who regarded widely spread drifts and glacial striæ as due to the stranding of ice-bergs in a sea. The present Memoir includes a photograph (p. 51) of the recently revealed water-worn surface of Carboniferous limestone underlying the Green Hills esker near Crumlin. The other photographs of glacial phenomena, also by Mr. R. Welch, give additional distinction to the Memoir.

Pp. 129–147 are concerned with Economic Geology, and Mr. J. R. Kilroe gives a valuable description of the relations of the drift to surface-soils. One of the most noteworthy points brought forward is the partial decalcification of the soils (p. 142) to a depth of two feet or more, wherever water is moving through them. Should this water, however, remain at such a depth as to be accessible to the roots of plants, the decalcification of the soil actually helps the vegetation, by furnishing the lime salts in solution. Hence (p. 143) the soils formed on the limestone boulder-clays are more satisfactory than those on the limestone-gravels. Sometimes the subsoil layer immediately below a calcareous soil is found to be deficient in calcium carbonate, which has accumulated again in the next succeeding layer by downward percolation.

Mr. Kilroe's second table (p. 147) is perhaps not set out so clearly as it might be; but it shows an elaborate series of determinations of the amount of calcium carbonate, that is regarded by him as available for plant food (p. 144) in different siftings of each soil examined. Presumably sieves with circular holes were employed; but it seems undesirable nowadays to measure in fractions of an inch, rather than in decimals of the metric scale. The material dealt with, and carefully subdivided into seven grades, is that with grains less than a quarter of an inch in diameter. The mode of separation of the "silt and finest sand" and the "finest silt and clay," the crucial feature in the mechanical analysis of soils, should, we think, be stated in all such records. The work done is an interesting and hopeful reminder of that initiated by the Ordnance Survey's geological branch under Col. Portlock about 1839.

Very few misprints or slips can be detected in this admirable Memoir, which is in this point also much in advance of previous publications. The earlier edition is responsible for "Mount Malpas" (p. 64, &c.), in place of "Mount Mapas," a name which originated in the Mapas family. In the lists of fossils (pp. 17-20), the addition of the names of authors is one of the many signs of the scientific spirit in which the work of revision has been performed. Both the Director, Mr. J. J. H. Teall, and Mr. G. W. Lamplugh, deserve our warmest thanks for the simultaneous issue of a map and Memoir that mark new era in Irish geological work.

Dublin.

NEWS GLEANINGS.

Joseph Pearson.

Joseph Pearson, B.Sc., who has been selected for the post of naturalist to the Ulster Fisheries and Biology Association, entered University College, Liverpool, in 1899, with one of the City Council technical science scholarships, and, from the beginning of his career as a student he was thus dedicated to technical pursuits. As an undergraduate he distinguished himself in all his classes; and, when he took his Bachelor's degree in 1902 at Victoria University, he got first-class honors in zoology, and was awarded a special prize in oceanography. He afterwards obtained a Victoria University scholarship in zoology, and a City Council scholarship for research. His first original work was on plankton; next he devoted a good deal of time to Prof. Herdman's Ceylon collections, and, in particular, worked up the Holothurians, describing numerous new species. He is now engaged on a memoir on the Shore Crab, to be published by the Liverpool Marine Biological Committee. Besides studying in Liverpool, he has worked at the Marine Biological Station at Port Erin, and at the Sea-fish Hatchery at Piel. He comes to Belfast with the strongest recommendations, and we cordially welcome him into the ranks of those working at Irish zoology.

TEN YEARS' WORK OF THE FAUNA AND FLORA COMMITTEE.

BY R. LLOYD PRAEGER.

It is now ten years since the committee of naturalists commonly known as the "Fauna and Flora Committee" was first appointed by the Royal Irish Academy to "frame a Report on the present state of our knowledge of the Flora and Fauna of Ireland, and as to what is needed to bring this knowledge up to date." It may be of interest to briefly review the work of the committee during the intervening decade, and to enquire as to how far it has succeeded during this period in furthering our knowledge of Irish natural history.

For many years past—since 1868, to be precise—the Royal Irish Academy has given grants of money in aid of scientific research in Ireland, these grants being voted by the Academy to applicants engaged in original work. It was thought by Dr. E. P. Wright, at the time Secretary of the Academy, that as regards natural history, a little organizing of the workers and of the work might have good results in economizing funds and increasing the output of scientific results. On his initiative, a committee was formed, "consisting of Dr. Scharff,* Mr. R. Lloyd Praeger,* Mr. A. G. More, Mr. R. M. Barrington, Mr. Greenwood Pim, Dr. H. Dixon, Dr. M'Weeney, Mr. G. H. Carpenter,* Professor T. Johnson,* and Professor E. P. Wright," and a grant was given them early in 1893 for the objects stated in the first paragraph of this article—to report on the state of Irish natural history. The Committee held its first meeting on 18th March, 1893. Dr. Scharff was elected chairman, and G. H. Carpenter convener. The Committee then resolved itself into two sections, charged respectively with the drawing up of reports upon the flora of Ireland, and upon its fauna (including Tertiary palæontology). In a few months the whole report was laid before the Academy Council. It was a valuable and a voluminous document, including separate reports on the various groups of plants and animals by R. M. Barrington, G. H. Carpenter, J. E. Duerden, Louisa

* Members of present Committee.

L. Glascott, A. C. Haddon, T. Johnson, W. F. Johnson, W. F. de V. Kane, J. J. F. X. King, David M'Ardle, E. J. M'Weeney, A. G. More, A. R. Nichols, Greenwood Pim, R. Ll. Praeger, R. F. Scharff, R. J. Ussher, and C. H. Waddell.

These reports amply demonstrated the need of systematic work at many groups in Ireland, and accordingly we find the Committee applying for and obtaining from the Academy in May, 1893, a grant of £50 to enable it to establish collecting stations. Since 1893, an annual grant, varying in amount from £35 to £80, has been made by the Academy to the Committee for the continuance of its investigations. In many cases the Committee has made grants to independent students applying to them, or to the Academy, always with the proviso that the scientific results, and an account of the expenditure, should be placed in their hands; but equally frequently the investigations for which grants were required have been undertaken at the Committee's request, on the same conditions. The Committee has thus directed the work and the expenditure on behalf of the Academy, and has been able to use to the best advantage the small sum available for natural history research. It remains to consider what scientific results have been obtained under its administration.

As to the personnel of the Committee, it is an annually appointed body, and the membership has varied from year to year, the aim being that all branches of zoology and botany should be represented, and that the Committee should be composed of working naturalists. Commencing with the list of names already quoted, the Committee has at various times included in addition G. E. H. Barrett-Hamilton,* N. Colgan,* J. E. Duerden, H. L. Jameson, D. M'Ardle,* F. W. Moore,* A. R. Nichols,* Robert Patterson,* R. J. Ussher, and Professor Gregg Wilson.* The Committee as at present constituted consists of those members whose names are marked with an asterisk in this list, and in the list on the previous page.

The first idea of the Committee as to prosecuting researches in the Irish fauna and flora was to select collecting stations, to which a party would proceed to make collections in as many different groups as possible. Accordingly we find that as soon as the first grant for carrying out investigations was received (May, 1893), a party composed of Carpenter, Duerden

T. Johnson, M'Ardle, M'Weeney, and Scharff were despatched to Berehaven to spend a week in making both terrestrial and marine collections. A profitable time was spent, and the groups studied included, in botany, Algæ, Fungi, Lichens, Hepatics, Mosses, and Phanerogams; and in zoology many groups of marine invertebrates, Insects, Spiders, land and fresh-water Mollusca, and fresh-water Sponges. Meanwhile, individual research was encouraged. The first grant given was made to Rev. W. F. Johnson, to assist him in studying the beetles of Donegal, a district hitherto little worked in that group; and within the first year the districts around Newry, Cavan, Roundstone, and Killarney received attention from either zoologists or botanists. In 1894 another joint expedition was organized. The little known Dingle Promontory was the district selected, and the party consisted of Halbert, M'Ardle, M'Weeney, and Scharff. This was the last general expedition despatched by the Committee. By this time the various groups of the flora and fauna had fallen into some kind of order as regards our knowledge of them; and henceforward we find the Committee concentrating its funds on certain definite groups, with a view to getting them worked out and published.

From the first the large order of Beetles received attention. About 1,000 species were on record when W. F. Johnson commenced his study of them in 1887. Joined by J. N. Halbert, and steadily backed by the Committee through the nineties, rapid progress was made. Johnson worked various northern counties—Louth, Armagh, Down, Antrim, Donegal, Sligo—while the areas worked by Halbert included various spots in Kerry and Cork, the Blackwater, Suir, and Barrow valleys, Limerick, Wexford coast and interior, the Westmeath lakes, Lough Ree, the Killeries, Roundstone, Woodford, Sligo, the Wicklow and Mourne Mountains, and Lough Neagh. This continued effort, reinforced by the aid of a number of other collectors, notably C. W. Buckle, resulted in the publication in 1902 of Johnson and Halbert's well-known "List of the Beetles of Ireland," in which 1,630 species are recorded from this country, with notes on their distribution occupying nearly 300 octavo pages of the Academy's *Proceedings*. Another group which has been steadily worked up under the Committee's auspices is the Hepatics. David

M'Ardle, our foremost student of this group, has visited the fascinating South-west repeatedly in search of these plants; also the Galtees and Wicklow mountains, Carlow, Wexford, Sligo, Cavan, and Donegal. He has already reported to the Academy on the results of many of these expeditions (see *Bibliography*, p. 131 below); and a comprehensive paper by him, embodying the full results of his own and others' researches, is just completed. The entomologists who have taken part in the various excursions have by no means confined themselves to the Beetles. The Spiders have come in for much attention, and the collections made, coupled with the information already published, chiefly by the late Thomas Workman of Belfast, has enabled G. H. Carpenter to publish in the *Proceedings* of the Academy his important "List of the Spiders of Ireland" (1898). Collections have been made in all the orders of Insects, the land and fresh-water Mollusca, the Mites, the terrestrial Crustacea, and other groups; of these, the Wood-lice have been published by R. F. Scharff, and it is hoped soon to publish full lists of the Mollusca, the Neuroptera, Orthoptera, Hemiptera, and Water Mites. The full list of Irish Lepidoptera lately produced by W. F. de V. Kane renders further publication in this group unnecessary. The few fresh-water Sponges which have been collected have proved of the very highest interest, and the addition to the Irish fauna of three American species unknown in Europe is without doubt the most important fact in faunistic distribution which has resulted from the Committee's work. (See under Hanitsch below).

The Committee have inaugurated a scientific examination of that most interesting sheet of water, Lough Neagh, and they were fortunate in securing the services of William West, who has now reported upon the Alga-flora of the lake and a large surrounding district.

So far we have dealt with terrestrial and fresh-water organisms, and indeed the Committee's work has so far been mainly directed to that section of the fauna and flora. The reason for this lies not in any deliberate intention, but in the fact that there is a paucity of workers at marine zoology and botany—no doubt the Ulster Fisheries and Biology Association will remedy this before long. But the Committee have not been altogether idle regarding marine groups. Shore

collecting carried out in a number of yet unworked districts enabled A. R. Nichols to publish the marine Mollusca, and a list of Irish Echinodermata by the same writer has now been issued. H. L. Jameson has published the Nemertines. In the Algæ, a large amount of material has been amassed, and the Brown Seaweeds and Corallines have been published by Professor Johnson.

The interesting results obtained from the working out by G. H. Carpenter of the animals captured in the Mitchelstown Cave on the joint Field Club excursion in 1893 drew the attention of the Committee to the subject of cave faunas, and grants were made to enable J. N. Halbert and H. Lyster Jameson to explore caverns about Enniskillen, and at Dunmore, Co. Kilkenny, as well as to make further collections at Mitchelstown. In consequence, further papers on the subject by G. H. Carpenter have appeared, and he is still engaged on this research.

It will be seen that the Invertebrates and the Cryptogams have mainly occupied the attention of the Committee. All the groups of the higher animals and plants are tolerably well known—except perhaps the fishes, and they cannot be studied or collected by itinerant naturalists, or during brief sojourns. It was from the beginning understood that the Committee was to direct its attention to the less known groups. As a matter of fact, just two grants have been made for the study of the higher organisms above mentioned—one to More, Ussher, and Warren to assist in completing the materials for their book on the Birds of Ireland, and one to R. Ll. Praeger in aid of the fifth and final year's field-work of "Irish Topographical Botany." Both works have now appeared, and place our knowledge of the distribution of these two large groups on a secure basis.

In palæontology, important work has been lately carried out by a Committee working under grants from the Fauna and Flora Committee and from the British Association, and engaged in investigating the cave deposits of Ireland. The Fauna and Flora Committee has provided half of the comparatively large sum—for this is expensive work—expended on cave-digging during 1901 and 1902, and the full results will be communicated by them to the Academy for publication.

One other valuable piece of work carried out by the Committee must be referred to. In the report which Prof. Haddon made to the Committee in 1893, he advocated the formation of a bibliography of Irish natural history. The Committee took up the idea at once. First R. Ll. Praeger and then J. N. Halbert were employed in preparing a slip-catalogue of all books, papers, and notes bearing on Irish animals or plants. The work was laborious, but it has now been completed as regards zoology. The records have been copied on standard American catalogue cards, and the whole housed in an oak card-catalogue case in the National Museum. This bibliography has already proved of the greatest service in the course of frequent references to the scattered records of Irish zoology.

In conclusion, it may be useful to list the papers which have been published dealing, in whole or part, with work carried out under the Committee's auspices. In the following list numerous short notes are omitted. The list contains not only reports on work done directly under grants from the Committee, but papers in which records made on expeditions organized or financed by the Committee form any considerable part; also certain papers, such as Scharff's "List of Irish Cetacea" which have been published in accordance with the Committee's scheme of publishing all the groups of the Irish fauna and flora as opportunity serves.

CARPENTER, George Herbert, B.Sc. :

Animals found in the Mitchelstown Cave. *I.N.*, IV., 25-35, plate 2. 1895.

Arachnida [of Galway F.C.U. Excursion] and Myriopoda [of ditto]. *I.N.*, IV., 254-6. 1895.

A new British Pantopod, *Tanystylum conirostre* (Dohrn.) *I.N.*, IV., 297-302, plate 6. 1895.

The Collembola of Mitchelstown Cave. *I.N.*, VI., 225-233, plate 2. 1897.

The Collembola of Mitchelstown Cave: Supplementary Note. *I.N.*, VI., 257-8. 1897.

A List of the Spiders of Ireland. *Proc. R.I.A.* (3), V., 128-210. 1898.

CARPENTER, G. H., J. N. HALBERT, and W. F. de V. KANE :

Insecta [of Galway F.C.U. Excursion]. *I.N.*, IV., 257-264. 1895.

See also under JOHNSON, W. F., and under SCHARFF, R. F.

DUERDEN, J. F., A.R.C.Sc. Lond. :

The Rock-pools of Bundoran. *I.N.*, IV., 1-7, plate 1. 1895.

FRIEND, Rev. Hilderic :

Field Days in Ulster. 1. *I.N.*, VI., 61-4. 2. *Ibid.*, 101-3. 1897.

Annelids new to Ireland. *I.N.*, VI., 206-7. 1897.

HALBERT, J. N. :

Insects collected in the Fermoy and Blackwater district. *I.N.*, IV., 45-9. 1895.

Insects collected at the Seagull Bog, Tullamore. *I.N.*, IV., 172-4 1895.

Coleoptera collected in Co. Carlow. *I.N.*, IV., 329-31. 1895.

Insects collected on Lugnaquilla and in Glenmalur Valley, Co. Wicklow. *I.N.*, V., 210-2. 1896.

Coleoptera [of Kenmare F.C.U. Excursion] and Hemiptera [of ditto]. *I.N.*, VII., 211-7. 1898.

See also under CARPENTER, G. H., and under JOHNSON, W. F.

HANITSCH, R. :

The Irish Freshwater Sponges. *I.N.*, IV., 122-131, plate 4. 1895.

HANNA, Henry, M.A., B.Sc. :

Some Algæ from the Antrim Coast. *I.N.*, VIII., 155-6. 1899.

See also under JOHNSON, Thomas.

HOOD, John, F.R.M.S. :

On the Rotifera of the County Mayo. *Proc. R.I.A.* (3), III., 664-706, plates 21-22. 1895.

JAMIESON, Henry Lyster, B.A. :

On the Exploration of the Caves of Enniskillen and Mitchelstown. *I.N.*, V., 93-100. 1896.

Notes on Irish Worms: 1. The Irish Nemertines, with a list of those contained in the Science and Art Museum. Dublin. *Proc. R.I.A.* (3), V., 34-39. 1898.

JOHNSON, Prof. Thomas, D.Sc., M.R.I.A. :

A Visit to Roundstone. *I.N.*, II., 313-316. 1893.

JOHNSON, Thomas, and Henry HANNA, M.A., B.Sc., assisted by Miss R. Hensman and Miss M. C. Knowles:

The Irish *Phaeophyceæ*. *Proc. R.I.A.* (3), V., 441-61. 1899.

JOHNSON, Thomas, and Rachel HENSMAN :

A List of Irish Corallinaceæ. *Sci. Proc. R.D.S.*, IX., 22-31. 1899.

JOHNSON, Thomas, and Matilda C. KNOWLES :

Seaweeds from the S.E. of Ireland. [Read before the Dublin Nat. Field Club, 9 March, 1897.] *I.N.*, VI., 139-140. 1897.

JOHNSON, Rev. William Frederick, M.A. :

Report on Insects collected at Coolmore, Co. Donegal. *I.N.*, IV., 95-9, 161-2. 1895.

Insects collected in Co. Sligo. *I.N.*, XI., 163-7. 1902.

JOHNSON, Rev. W. F., and J. N. HALBERT :

A List of the Beetles of Ireland. *Proc. R.I.A.* (3), VI., 535-827. 1902.

JOHNSON, Rev. W. F., J. N. HALBERT, and G. H. CARPENTER :

Insects collected by the Royal Irish Academy Fauna and Flora Committee, 1893. *I.N.*, III., 83-9, 103-5, 122-4, 153-5 170-2, 198-9. 1894.

KANE, William Francis de Vismes, M.A., D.L., M.R.I.A.:

Observations on the development of Melanism in *Camptogramma bilineata*. *I.N.*, V., 74-80. 1896.

See also under CARPENTER, G. H.

M'ARDLE, David:

A Visit to Castletown-Berehaven. *I.N.*, III., 189-93. 1894.

Hepaticæ collected in Co. Carlow. *I.N.*, V., 200-2. 1896.

Report on the Musci and Hepaticæ of the County Cavan. *Proc. R.I.A.* (3), IV., 606-17, plate 21-22. 1898.

Report on the Hepaticæ of the Dingle Peninsula, Barony of Corkaguiny, County Kerry. *Proc. R.I.A.* (3), VI., 289-330, plate 16-17. 1901.

The Hepaticæ of Ross Island, Killarney. *I.N.*, IX., 23-26, plate 1. 1900.

NICHOLS, Albert Russell, M.A., M.R.I.A.:

A List of the Marine Mollusca of Ireland. *Proc. R.I.A.* (3), V., 477-662. 1900.

A List of Irish Echinoderms. *Proc. R.I.A.*, XXIV. B. 231-267, 1903].

POCK, R. I.:

Notes upon some Irish Myriopoda. *I.N.*, II., 309-312. 1893.

PRAEGER, Robert Lloyd, B.A., M.R.I.A.:

Botanical Field-work in 1900. *I.N.*, X., 29-41. 1901.

SCHARFF, Robert Francis, PH.D., B.SC., M.R.I.A.:

The Irish Woodlice. *I.N.*, III., 4-7, 25-29, plate 2. 1894.

The Irish Freshwater Leeches. *I.N.*, VII., 188-194. 1898.

A List of the Irish Cetacea. *I.N.*, IX., 83-91, plates 3-4. 1900.

Armadillidium pulchellum, Brandt, a Woodlouse new to the British Islands. *I.N.*, X., 109-10, illustr. 1901.

Notes on Irish Planarian Worms. *I.N.*, X., 133, illustr. 1901.

SCHARFF, R. F., and G. H. CARPENTER:

Some Animals from the Magillicuddy's Reeks. *I.N.*, VIII., 213-8. 1899.

TATLOW, Emily Mary:

Marine Shells from South-west Donegal. *I.N.*, VIII., 235-8. 1899.

WEST, William, F.L.S., and Prof. G. S. WEST, M.A., F.L.S.:

Notes on the Algæ of Lough Neagh. (Provisional Report.) *I.N.*, X., 86-7. 1901.

A Contribution to the Fresh-water Algæ of the North of Ireland *Trans. R.I.A.*, XXXII. B., part 1, 1-100, plates 1-3. 1902.

HEPATICÆ FROM CO. WEXFORD.

BY DAVID M'ARDLE.

(Collected for the Royal Irish Academy Flora and Fauna Committee.)

IN May, 1899, Mr. J. N. Halbert and I spent a few days in Enniscorthy, tempted by Mr. Moffat's description of Killoughrim Forest,¹ which is about 4 miles northwards from the town. "The main remnant," he writes, "of the old natural wood of Oak, Birch, Hazel, Holly, Guelder-rose, and Broom, which in by-gone years covered a great part of the country, is, so far as I have been able to observe, almost completely free from introduced vegetation." This was written by him in describing the haunts of *Formica rufa*, in which Mr. Halbert was much interested. Although the place where the forest once stood is thickly covered with young Oak and Alder trees, scrub, &c., and now offers little temptation to the bryologist, the result of my collecting was interesting, as will be seen by the appended list. Among them is *Lejeunea flava* in small quantity, typical specimens, which doubtless grew plentifully in the old forest, where there was shelter and a moist genial atmosphere suitable to this denizen of the Amazon Valley. The minute *Lejeunea ulicina* was frequent on the bark of Alder, &c., and the curious *Metzgeria conjugata* was gathered in fruit, and close to a pathway *Kantia argula* flourished. The presence of these plants leads one to conclude that many rare Hepatics disappeared with the large trees and decaying logs which afforded the material for their development. I went one morning to the slopes of Mount Leinster and struck the Urrin River about Woodbrook, and followed it up to its source near Killeley village, and collected on to the borders of Knockroe, where a stream is the boundary between the counties of Wexford and Carlow. I spent the last day of our visit along the Slaney, which I crossed at Edermine Junction and got into the wood (Ringwood?), which I followed to its termination near the town, and found some interesting Hepatics. It was a short but interesting excursion, and I regretted that time

¹ *Irish Naturalist*, vol. V., p. 143, 1896.

would not permit me to visit Ballyhyland and to see more of Mr. Moffat.

In the appended list I have also included many interesting Hepatics collected for me by my friend Dr. Greene of Ferns, making a total of 33 species, and five varieties. I am not aware of the publication of any previous list or published localities of these curious plants in Co. Wexford.

Frullania Tamarisci, L., Dumort.—On the bark of trees, Killoughrim Forest.

Frullania dilatata, L., Dumort.—On trees, Ballybeg, near Ferns, Dr. Greene, Oct., 1896. Wood by the Slaney.

Lejeunea serpyllifolia, Dicks., Libert.—On trees, Killoughrim Forest. Wood by the Slaney, near Enniscorthy.

var. **heterophylla**, Carrington.—Wood by the Slaney.

Lejeunea flava, Swartz, Nees.—Killoughrim Forest, very scarce. Wood by the Slaney, near Edermine Junction.

Lejeunea ulicina, Taylor.—On trees, Killoughrim Forest.

Radula complanata, L., Dumort.—On trees near Ferns, Dr. Greene, Dec., 1895. Killoughrim Forest, plentiful.

Porella platyphylla, L., Lindb.—On stones at the summit of Dermot M'Murrough's Castle, near Ferns, Canon Gibson and D. M'A., 1897.

Lepidozia reptans, L., Dumort.—Killoughrim Forest, fertile.

Kantia Trichomanis, L. (Gray and Bennett).—Killoughrim Forest. Ditch banks about Knockroe.

Kantia arguta, Mont. et Nees, Lindb.—Kilbora wood, near Ferns, Dr. Greene, Oct., 1896. Killoughrim Forest. Wood by the Slaney River, near Edermine Junction. Bank of the Urrin River, near Knockroe.

Cephalozia bicuspidata L., Dumort.—Banks of the Urrin River, common. Killoughrim Forest. Kilbora Wood, near Ferns, Dr. Greene, Oct., 1896.

Note.—A curious reddish form is common on the pathways in Killoughrim Forest. I could find neither male or female fruit, and it may be distinct.

Cephalozia Lammersiana Hüben, Spruce.—Wood by the Slaney, rare.

Cephalozia divaricata, Smith.—On decayed wood, Killoughrim Forest.

Scapania resupinata, L., Dumort.—Near Ferns, Dr. Greene, Oct., 1896. Killoughrim Forest. Wood by the Slaney.

Scapania nemorosa, L., Dumort.—Killoughrim Forest.

Scapania undulata, L., Dumort.—Among wet rocks, Knockroe.

var. **speciosa**, N. ab E., p. 66.—Wet rocks in a stream, Knockroe.

var. **purpurascens** Huben, Hep. Germ.—Bank of stream, on rocks, Knockroe.

Scapania uliginosa, Swartz, Dumort.—Swampy place near Knockroe.

- Diplophyllum albicans**, L., Dumort.—Wood by the Slaney. Bank near Ferns, Dr. Greene, Oct., 1896. Killoughrim Forest. Ditch banks about Knockroe, common.
- Lophocolea bidentata**, L., Dumort.—Killoughrim Forest. Wood by the Slaney, common about Ferns. Dr. Greene, 1896.
- Lophocolea cuspidata**, Limpricht.—On decayed wood, Killoughrim Forest.
- Plagiochilia asplenoides**, L., Dumort.—Rocky bank, Killoughrim Forest.
- Jungermania** (*Aplozia*) **crenulata**, Smith.—Bank of the Urrin River.
- Jungermania** (*Aplozia*) **gracillima**, Smith.—Killoughrim Forest.
- Nardea scalaris**, Schrad.—Banks of streams about Knockroe, common.
- Marsupella emarginata**, Ehrhart, Dumort.—On rocks, Urrin River. Streams on stones, Knockroe, common.
- var. **minor**, Carrington.—On rocks, wood by the Slaney.
- Saccogyna viticulosa**, L., Dumort.—Killoughrim Forest.
- Blasia pusilla**, Linn.—Killoughrim Forest.
- Pellia epiphylla**, L., Lindberg.—Near Ferns, Dr. Greene, Dec., 1895. Killoughrim Forest. Ditch banks about Knockroe, common.
- Pellia calycina**, Tayl.—Marsh in wood by the Slaney.
- Aneura multifida**, L., Dumort.—Wood by the Slaney. Knockroe.
- Metzgeria furcata**, L., Raddi.—On the bark of trees, Killoughrim Forest.
- Metzgeria conjugata**, Lindberg.—Near Ferns, fertile, Dr. Greene, Dec., 1895.

Royal Botanic Gardens, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a baby Elephant and a Panther from the Duke and Duchess of Connaught, which we are gratified to hear have safely arrived in Dublin; a White-crowned Mangubey from Mrs. Lloyd Foster, a pair of Meerkats from Lieut. B. S. Stephenson, a Wigeon from Mr. R. Warren, three Racoons and five Flying Squirrels from Mr. Hornady, director of the New York Zoological Gardens; a Serin Finch and South African Sparrow from Capt. Downing, five Flying Squirrels from Mr. A. E. Goodbody, and a Chameleon from the Hon. Claude Brabazon. A pair of Black Apes have been purchased.

Lord Iveagh has generously given £200 and Mr. J. Jameson £50 towards defraying the expenses rendered necessary by the destruction of cages during the recent storm, and many smaller donations have been received.

DUBLIN MICROSCOPICAL CLUB.

MARCH 11.—The Club met at Leinster House.

Dr. SCHARFF exhibited a section through the ovary of a salmon, to show the structure of the immature egg just before extrusion. He pointed out that the large nucleus in the section was apparently breaking up, and that the nucleoli were travelling towards the periphery. He also made some remarks on the numerous vacuoles found in the egg, on the egg membranes, and on the origin of the yolk spherules.

Mr. F. W. MOORE exhibited sections through a peculiar swelling found on the roots of an orchid imported from Madagascar. These swellings appeared as nodules at intervals along the roots, and seemed to be abnormal growths. The cells in places were large, and the walls much thickened, the thickening material being interrupted by canals at very regular intervals, giving the walls quite a beaded appearance when viewed in cross section.

Mr. WILLOUGHBY D. DADE exhibited specimens representing two genera of freshwater Polyzoa—viz., *Lophopus* and *Paludicella*. The latter is remarkable as being the only freshwater Polyzoan belonging to the order Gymnolœmata (throat unprotected by an epistome), which practically includes all the marine families. All the species of this order are also characterised by a circular crown of tentacles, the absence of a calyx or cup round the crown, and by *not* being reproduced by means of "statoblasts."

In *Paludicella*, however, the young buds are protected from the cold of winter by becoming sealed up in horny sheaths (hybernacula), which open on the return of spring, the terminal tubes splitting vertically and releasing the young animals.

Paludicella is of humble appearance, and a colony bears so strong a resemblance to dead weed, that it might easily be overlooked. *Lophopus* (the *Polypa panache* of its discoverer, Abraham Trembly) is a good type of the order Phylactolœmata (throat protected by an epistome), which is confined to fresh water. This epistome is co-extensive with the crescentic or horse-shoe crown of tentacles, the latter being surrounded at the base by a calyx. In this order also there is a curious method of reproduction by "statoblasts," or winter eggs, which are regarded as free buds, and not as ova. There is a division of opinion as to whether *Lophopus*, like *Cristatella*, is locomotive. The exhibitor had kept specimens for some time, and had never seen signs of such power.

Mr. M'ARDLE exhibited specimens, in fruit, of *Tetraplodon Wormskjoldii*, Lindb., and also dried specimens, which were collected by Mr. M. B. Slater, of Malton, in peat moss swamps, top of Widdybank Fell, Upper Teesdale, June 10th, 1870, and placed in his herbarium as a robust form of *Tetraplodon mnioides*, where it remained until its recent discovery in the same locality by Messrs. Horrell and Jones (*Journal of Botany*, vol. xl., p. 49, 1902). Along with being a beautiful microscopic object, on

account of the delicate structure of the leaves, &c., the plant is remarkable as being the most arctic moss in the British Islands, and should be looked for by Irish and Scotch collectors in the habitats of *Splachnum*, and among herbarium specimens under the latter name; it may be at once detected on account of the small size of the fruit. It is well known to grow in arctic North America, Greenland, Melville Island, Norway, &c. Mr. M'Ardle also exhibited an excellent drawing of the plant by Mr. E. Salmon (*Journal of Botany*, vol. xl, tab. 430, 1902).

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL, 7.—GEORGE COFFEY, M.R.I.A., Keeper of the Irish Antiquities in the National Museum, Dublin, lectured on "A Lost Principle in Art."

BELFAST NATURALISTS' FIELD CLUB.

MARCH 17.—The President (F. J. BIGGER) in the chair. The evening was devoted to the exhibition of lantern slides, dealing with natural history and archæology. W. A. GREEN exhibited and described some new views of slide cars in the north of Antrim, and some rock scenery on the Antrim Coast. H. M'CLEERY and G. M'LEAN then showed a number of slides of organisms obtained on a former dredging expedition in Belfast Lough. ROBERT WELCH exhibited a number of slides showing the perforation of rocks by *Helix aspersa*, and elucidated a much-disputed point as to the origin of certain rock markings which he had observed near Whitehead. Views of the recent floods at Limavady Junction and the erosion of cliffs gave evidence of the severity of last month's storm. JOSEPH WRIGHT contributed a note on foraminiferal Boulder-clay from Woodburn, Carrickfergus. The list is now brought up to 100 species. No other British locality has yielded such a number of Pleistocene forms. One ounce of the clay which was examined with great care was found to contain 2,000 specimens. Of the rarer forms, the following are the most interesting:—*Lagena depressa*, *Frondicularia millettii*, and *Truncatulina reticulata*. There now only remains by the side of the Woodburn stream a very small exposure of this highly fossiliferous clay, and what there is will probably ere long get covered with the soil. The remainder of the evening was occupied by JAMES STRELFox, who exhibited a large number of excellent slides of the west coast of Norway and Spitzbergen. The election of a new member closed the meeting.

NOTES.

BOTANY.

Some Rare Plants in Mid Cork.

The following plants were noted at Currabinny last summer:—*Fumaria Borai*, Jord. (*vide* H. W. Pugsley), plentiful on the shingle near the pier. † *Vicia tetrasperma*, Moench, abundant on the shingle, roadside, and waste ground about the pier, growing with *V. hirsuta*, Koch, and thoroughly established. *Picris echinoides*, Linn., in some plenty on the shingle with the above; this plant does not appear to have been noticed in Mid Cork since 1854 (*vide* "Cyb. Hib.," 2nd Ed., p 198).

R. W. SCULLY.

Dublin.

The Leaf-marking of *Arum maculatum*.

I have made no close study of the plant, but from Yorkshire to Surrey and Sussex I have noted that it has generally *black-spotted* leaves; whereas in Ireland its leaves are mostly green and unspotted. In England green-leaved forms *without* black spots seem to me to be rare, and the converse seems true in Ireland.

In England the *spath* is often spotted as well as the leaf, but I have never seen a *spotted spath* in Ireland.

F. W. BURBIDGE.

Trinity College Botanic Garden.

Our Alien Flora.

Mr. S. T. Dunn, lately appointed Botanical Superintendent in Hong Kong, has issued "A preliminary list of the Alien Flora of Britain." The list includes "firstly, all the presumably non-indigenous species hitherto recorded as growing spontaneously in the British Isles, and secondly, all those species which, though probably natives, have so far been exclusively or chiefly recorded in Floras in their non-indigenous localities." The first class, distinguished by Roman type, includes our cornfield weeds, ballast plants, casuals, and escapes down to *Syringas*, *Rhododendrons*, and *Laburnums*. In the latter class, printed in italics, it is a surprise to find two of our famous Irish Heaths, *Erica mediterranea* and *Daboecia polifolia*, as well as many such widely distributed and abundantly recorded natives as *Saxifraga tridactylites* and *Erodium cicutarium*. Mr. Dunn's italicised group evidently refers to native plants which have been recorded from localities where they are non-indigenous; but his definition of the group does not fit his list. As a first gathering together of our alien flora, Mr. Dunn's effort will be welcomed by all field botanists.

ZOOLOGY.

Orthoptera from South Kerry.

When enumerating the Insects collected by our party, in the March *Irish Naturalist*, I forgot to include the Orthoptera named by Mr. Malcolm Burr. They were very few, including the Earwigs *Forficula auricularia* and *Labia minor*, and the little Grasshopper *Tetrix bipunctatus*, which occurred plentifully on roads and rocks around Caragh Lake, the colour being exactly like that of the rocks, so that the insects could hardly be seen when at rest.

HORACE ST. J. DONISTHORPE.

Kensington.

Hybernia aurantiaria in County Wicklow.

From one of a miscellaneous lot of larvæ got in the Glen of the Downs last June, I reared a richly-coloured imago of the above in December. This is the first record, I believe, for Co. Wicklow. I am indebted to Mr. Carpenter for confirmation of the specific name of this variable moth.

BALFOUR BRUCE.

Dublin.

Irish Land Mollusca.

The current number of the "Journal of Conchology" (vol. x., no. 10) contains a short paper by R. Welch, on the association of *Helix nemoralis* and *H. hortensis* in Ireland, and a note by the same worker on *Clausilia bidentata* and *Balea perversa* in Ireland. J. R. le B. Tomlin contributes a notice of his finding of *Vestigo Heldi* in Ireland, as recorded in our last issue; but, from a note appended to his article, we gather that the identification cannot yet be looked upon as final. The same number contains a plate and explanation of the vice-counties of Great Britain and Ireland, as employed for recording the distribution of Mollusca: Babington's sub-division of Ireland is here erroneously attributed to H. C. Watson.

A Winter Song-Thrush's Nest.

A nest of the Song-Thrush, containing eggs, was seen by a reliable friend of mine near New Ross, Co. Wexford, on about the 14th of November, 1902. Although not unique, such winter nests are probably worth recording in the pages of the *Irish Naturalist*.

G. E. H. BARRETT-HAMILTON.

Kilmanock, Arthurstown, Waterford.

Carrion Crow in the Irish Channel.

On Tuesday, March 31st, as I was crossing the Irish Channel from Dublin to Holyhead, I noticed a Carrion Crow (*Corvus corone*) following astern of the steamer. When I first saw the bird we were still about twenty-five miles off the South Stack headland; it appeared to fly away from a large flock of clamorous Herring Gulls, which were greedily feeding on floating refuse. Whether the crow was attracted seawards from the Holyhead district, where it is not uncommon, for the purpose of procuring food or not, it is hard to say. It leisurely followed the boat, being strong and buoyant on the wing, nor had it the appearance of a bird anxiously heading for its destination, overcome by migratory fatigue. In the distance I might have mistaken this bird for a Rook (*Corvus frugilegus*), but when it came several times quite close to the deck, where I was standing, I could see by its characteristic flight and heavier build that it was undoubtedly a true *Corvus corone*. When we came within three miles of Holyhead, the crow (which up till then had followed the vessel somewhat closely) left us, and steered for the land below the South Stack lighthouse. I watched it until it ultimately disappeared among the shadows of the cliffs. Although common in parts of England and Wales, the Carrion Crow is *extremely rare* in Ireland, and it seems curious that a few wanderers have not occasionally ventured across the Channel. This they may have done oftener than we think, as the Carrion Crow is easily overlooked and confounded with the Rook.

CHARLES J. PATTEN.

Sheffield.

Donegal Birds.

The *Zoologist* for March contains an interesting article by W. C. Wright, entitled "Ornithological Notes from Co. Donegal." We much regret that the author has given such particulars of the nesting-locality of the Red-throated Diver as would lead to its identification. Consequently, we may expect to hear of renewed raids by English collectors. We wish that the example set by Mr. Williams, in his article on the Red-necked Phalarope in the February *Irish Naturalist*, had been followed, and only the vaguest details of the nesting-locality given.

Marten in Co. Londonderry.

In the first week of February, 1903, an exceptionally large male Marten (*Mustela martes*) was trapped near Castlerock, on the farm of Mr. Con Doherty. Several fowls had disappeared in a mysterious manner, and the Marten being seen one day near the fowl-house, a trap was set and the poor creature caught. Its fur was almost black, and it weighed about 5 lbs. The last Marten I have a note of from this county was caught in the same neighbourhood in June, 1900.

ROBERT PATTERSON.

Belfast.

GEOLOGY.

From the "Morning Post."

In view of recent graphic descriptions of the ascent of Mont Pelée the following extract from the *Morning Post*, or *Dublin Courant*, for June 12, 1788, may be of interest, especially to northern geologists:—

VOLCANO AT KNOCKLADE.

"In my last I gave a short account of the *Volcano* which discovered itself here on the 30th of last month, and the devastation which ensued in consequence. Fine as the year appears otherwise, we have had, in this Kingdom, tremendous phenomena of fire and water. The moving bog in the county of Tipperary did not, however, cause so much mischief as the late irruption of fire in this neighbourhood. It forms an awful but melancholy spectacle; many fine fields are covered with ashes, and a sort of cinder like the pumice stone; and the Lava, in its course to the sea, has destroyed four villages. Happily, indeed, the bosom of the ocean put an end to its mischievous progress, but such a quantity of dead fish of all kind has been thrown on shore, that the people are actually manuring their lands with them.

"We have had some visitors here from the Hebrides, and numbers all round the adjacent parts are coming in daily to view the volcano. I yesterday ventured up Knocklade, in company with Mr. M'Leod (whom Johnson mentions with so much honour, when in the Island of Coll,) Doctor Hamilton of Portrush, and some other gentlemen, and though a great quantity of smoke was still issuing, we could distinctly perceive that the *crater* formed by the irruption was not more than a hundred yards in diameter; but we could not approach near enough to the mouth, in order to look in, on account of the heat. I ventured my walking-stick into some of the ashes, which in two minutes burned the end of it. We put an egg into another part, which in three minutes exploded, and went off in powder. Our ground being too hot for us, we descended, and found the leather of our shoes considerably scorched, and reduced to powder."

Dublin.

R. LLOYD PRAEGER.

Bog-flows.

To the *Vierteljahrsschrift* of the Naturforschende Gesellschaft in Zurich (Jhg. xlii., 1897), Prof. Jakob Früh contributes a paper on bog-flows. It is really an account of the Killarney outburst of 1896, as described by Cole, Sollas, and Praeger, with notices of previous bog-flows taken mainly from the reports of the same writers.

THE UNNATURAL HISTORY OF AN OIL-WELL.

BY PROF. GRENVILLE A. J. COLE, F.G.S., M.R.I.A.

OF late a considerable literature has arisen, especially in the London press, in regard to the alleged rise of petroleum in the cellar of a house in Dublin. The Editors of the *Irish Naturalist* have in consequence asked me to make some communication on the subject. The Secretary of the Department of Agriculture and Technical Instruction has kindly allowed me to use the information collected during recent official inquiries, and this help I gratefully acknowledge; at the same time, any statements in the present note are made entirely on my own responsibility. If I remain sceptical as to the alleged "discovery," the scepticism is personal to myself. I trust, however, to show that doubt is in this case philosophic.

On Saturday evening, January 31, 1903, Mr. Christopher Moran, of 100, Summerhill, Dublin, called at my private house, and brought with him two bottles containing a small proportion of water and a large proportion of yellow fluorescent mineral oil. He stated that this oil had been noticed on the previous morning on the surface of a spring of water, which runs in a little conduit through the cellar of his mother's house at the address given; the occurrence of a trap enabled the family to collect enough oil to fill several pails.

The matter was of sufficient interest to merit immediate inspection. On the following morning I called on Mr. J. Holms Pollok, B.Sc., who kindly came with me as an expert chemist, and we saw the oil running freely, and pans and pails filled with it in the cellar. It burned well in a common lamp; but we naturally recommended caution.

We learned that a neighbouring oil-store had an underground pipe from which leakage might occur. The source of the water in the cellar was not apparent, but it clearly runs in from the higher ground that stretches towards Mountjoy-square. It may be a true spring from the underlying limestone, and yet be liable to contamination where it traverses the superficial

deposits. A smaller spring rises in the front of the basement of the house, and both are conducted into the main drain along Summerhill.

On hearing of the entry of oil into Mrs. Moran's premises, the neighbours cleared their pipe, but found no present leakage. I informed the Department of the facts on February 2nd; but suggested that the material might still be from a natural source; and on the 11th I sent in the results of Mr. Pollok's examination of the oil which he himself collected. These results showed that the material was artificially refined oil, and not a crude petroleum; and Mr. Moran was informed of this through official channels on February 13th.

Meanwhile, on February 3rd, the *Evening Telegraph* of Dublin had published an accurate and cautious article, headed "Oil spring or oil barrel?" in which a sketch of the conduit was given, and attention was drawn to Mr. M'Cullagh's adjacent oil-store. This article was repeated in the *Freeman's Journal* of the following day.

The oil, curiously enough, continued to flow on the surface of the water, and news of it became widely spread in London. On February 14th, the *Petroleum Review and Mining News* recorded the bare fact of its occurrence, wisely awaiting further information, and stating that samples were in the hands of Prof. Joly and myself. Somewhere about February 16th, however, a London journal, a cutting from which has reached us without proper heading, announced that a Dublin scientist, "Professor Call, states that he has no doubt that it is a natural petroleum spring." Experts were said to recommend boring, and it was asserted that the landlord had received notice to be prepared for operations which the Agricultural Board were about to carry out. The well, it was stated, had flowed "in its crude state" for several years past, the crude state being presumably water. Such is our latter-day journalism!

About February 18th the *Westminster Gazette* sent an interviewer to Mr. Henry, the editor of *Petroleum*, another organ of the oil trade, and received rather optimistic opinions. Mr. Henry stated that he had sent a bottle of the oil to Dr. Boverton Redwood, and regarded it as "a very fair oil," adding, "It is not crude or liquid fuel oil." Mr. Henry is further reported as having stated that the land at Summerhill was reclaimed

from the bog, and therefore offered probability of oil. This pleasing assertion was copied into Dublin journals, and the *Daily Express* of this city obtained a long article from Mr. Henry on February 28th. Interesting accounts were here given of similar appearances of oil in England, including an unexplained occurrence in a well near Shepton Mallet in 1894, on the strength of which a company was floated with a capital of £60,000. In Ireland, such copious finance almost takes one's breath away.

The oil was flowing in very small quantity when I revisited Summerhill on February 19th, and ascertained that leakages had taken place in the past from the adjacent oil-store, though none had been detected during recent months. Alterations in drains had, however, been made in the rear of the premises, and old oil might have been thus allowed to flow into the channel of the spring. Mr. Henry's samples must have been collected about this time, for they gave Dr. Redwood very poor results—(*Pall Mall Gazette*, quoted by *Daily Express*, 28th February, 1903).

"G. H. K." the well-known Irish geologist, wrote to the *Irish Times* of February 24th, deprecating "a wild goose chase after improbable oil in the shales;" and the *Freeman's Journal* of February 28th recorded the determination of the refined nature of the oil by Dr. Ryan and Mr. A. J. O'Farrelly of the Catholic University College. The full results obtained by these chemists were published in the same journal on March 4th, and confirm, absolutely independently, those furnished by Mr. J. Holms Pollok to the Department. In face of Mr. O'Farrelly's paper, no one in Ireland seems to have regarded the occurrence as other than a leakage; and the *Freeman's Journal* pointed out the bearing of the scientific results in a brief and effective editorial. The credit for the disseminations of correct views on No. 100, Summerhill, rests then with Messrs. Ryan and O'Farrelly.

This appears to have given some irritation to the energetic editor of *Petroleum* (article of ten and a-half columns in issue for 7th March, 1903). He had personally visited the locality on March 1st, and had taken a keen interest in all the published details. He boldly asserts (p. 803) that he is "against the small body of dogmatic academicians at the University who

have, in an offhand manner, asserted that what has been collected is the oil of commerce escaping from an ordinary storage depot. This is an absurd theory, arrived at without technical assistance."

Councillor Briscoe is quoted as the rival authority, who has already brought "the few University disbelievers" over the "bog origin idea." The dome-like formation of Mountjoy-square is cited in favour of the supply being natural, as if this surface-feature had anything to do with bogland, or, on the other hand, with any anticlinal curvature of the underlying strata. On the same reasoning the dome of St. Paul's should form a happy hunting ground. Dr. Ryan and Mr. O'Farrelly (p. 805) are, however, very fairly treated, their results being stated in full, while Mr. Briscoe is made to pose as holding "an anti-collegiate view." The article then goes off from Dublin, and we are glad to learn later that "Dublin University wiseacres may be right." But, if so, why "wiseacres"? Why this studious posing of the "technical" man against the cultivators of observation and research? Why, on that special visit to Dublin, was no attempt made to secure a sample of the oil from those who had collected and examined it when it was running freely? It is this attitude of contemptuous opposition to research that makes the article seem worthy of mention in these pages. It goes far to justify the pessimism of scientists in regard to Britain's industrial future; for unfortunately it by no means stands alone. Ireland has much to learn from England, both in method and steady application; but it would be no matter for surprise if the "unpractical" country, with her keener intellectual use of the imagination, were to establish her growing industries on a firmer basis than that accepted so complacently across the water.

Royal College of Science, Dublin.

THE LEAF-SPOTS OF ARUM MACULATUM.

BY GEORGE H. PETHYBRIDGE, PH.D., B.SC.

A PROPOS of Mr. Colgan's article on this subject in the March number of the *Irish Naturalist*, a few notes which I have collected may be worth putting on record. With regard to the relative distribution of the spotted and the unspotted forms on the Continent, I may add to the French and German authorities, quoted by Mr. Colgan, a Dutch and the two principal Belgian authorities. Devos in his *Flore de la Belgique*, 1885, says that the leaves are often spotted with black (*souvent tachées de noir*), and Crépin in his *Manuel de la flore de Belgique*, 1884, says that the leaves are green, or spotted with black (*Feuilles . . . vertes et concolores ou maculées de noir*). Hall, in his *Neerlands Plantenschat*, 1854, speaks of the ordinary spotted Arum (*zoaals in de gewone of gevlekte Aronskelk*).

Stahl, in a most interesting paper on coloured foliage-leaves,¹ states, however, on the authority of Ascherson (*Flora der Provinz Brandenburg*), that in this province the leaves are always spotted; whereas, according to Kirchner (*Flora von Stuttgart und Umgebung*), in Würtemberg the leaves are never spotted.

As regards the distribution of the two forms in Great Britain, I was under the impression that in Cornwall and Devonshire, at any rate, the spotted form was the more common of the two; but not having spent time in the spring in either of these counties for some years, I wrote to a botanical friend living in mid-Cornwall for information. He replied that his impression was the same as mine, but that he would make observations on the point. These observations resulted in establishing the fact that the green unspotted form was by far the more common, and that the spotted form was comparatively scarce. So much for the value of impressions! In order to obtain further information, I addressed

¹E. Stahl.—Ueber bunte Laubblätter. *Annales du Jardin Botanique de Buitenzorg*, t. XIII., 1896.

a circular on the matter to the secretaries of some forty or fifty Natural History Societies and Field Clubs in England, Wales, and Scotland, enclosing a copy of questions to be answered either by themselves or by other botanists in their respective societies.

The result of this appeal to the Societies has been a most gratifying one, as replies have been sent in in most of the cases; a great many of these replies embody observations actually made on the point in question, and my best thanks are due to those who have so kindly and—in some cases—so enthusiastically joined in the work. In Scotland *Arum maculatum* is an uncommon plant, and where it does occur its leaves are never spotted. One of my correspondents, however, in Greenock, points out that Kennedy's *Clydesdale Flora*, 1865, mentions that it is often found with purple spots, and gives some localities for the plant. Another correspondent in Glasgow informs me, that on an excursion of the Andersonian Naturalists' Society on April 4th of this year, "two or three plants of *Arum maculatum* were found outside a garden wall by the roadside, and, contrary to all other former experiences, the leaves of these plants were evenly marked with black rectangular-shaped spots. This makes for us a new station, and a new variety of the plant."

From Wales, up to the present, only one reply has been received, which states that the unspotted form is the commoner.

From England replies have been received, dealing with twenty-two counties; in several instances two or three replies being sent in from the same county. The Northumberland, Durham, and Newcastle-upon-Tyne Natural History Society deserves special mention for the interest taken in the question, its secretary, Prof. Potter, having sent in a schedule containing the results of the observations of fifteen workers, as well as those of the members of the Gateshead Natural History Society, and a map showing the distribution of the plant in the County of Durham.

It is scarcely necessary to go into the details of the results thus collected; suffice it to say that in every case, with the exceptions presently to be mentioned, the form with unspotted leaves is by far the commoner of the two. Thus, from Northumberland the report is "about 90 per cent. are

plain green"; from Hereford, "the unspotted form is the more abundant in the proportion of at least five to one"; from Sussex, "almost all here have green leaves, quite 99 per cent."; from Lincoln, "unspotted plants 250, spotted plants 20"; and so on.

The three exceptions all hail from the south of England. Mr. G. C. Walton, F.L.S., of Folkestone, says he *thinks* the spotted form on the whole is the more abundant. Mr. J. D. Turney gives the same as his opinion, and that of another botanist, for the neighbourhood of Plymouth. And Miss Groom reports for one locality near Hastings, "so far as I have observed, the one with spotted leaves is the most abundant." These exceptions are probably purely local, since from the three counties in which the above towns are situated, other reports stating that the converse is the case have also been received.

Hence, it may, I think, be safely concluded that in England, as in Ireland, the plant with spotted leaves is much more uncommon than the one with plain green leaves. Relatively, the spotted form may be rarer in Ireland than in England, although I am inclined to think that careful observations may lead to the recording of the spotted form in an increased number of localities in this country. I know of at least three such which have been noted in County Dublin during the past twelve months or so, and the attention of field workers might well be directed to this point.

Passing on to consider the nature and the cause of the spots, considerably more information requires to be accumulated before satisfactory conclusions can be arrived at. Undoubtedly the immediate cause of the dark purple colour of the spots is the presence of a soluble colouring matter, generally known as anthocyan or erythrophyll, in the cell-sap of certain of the cells of the leaf. The same colouring matter, masking the green chlorophyll, also occurs very frequently in various plants; for instance, to it is due the coloured leaves of our "copper" beeches, hazels, etc. In the cold weeks in spring the young organs of a very large number of our common plants develop this colouring matter, but only to lose it again as the weather becomes warmer and the new organs more sturdy. This transitory colouration has been

studied by Pick,¹ and by Overton,² amongst others; and it would seem from the latter's researches that the colour is a consequence of the increased content of sugar in the leaf at the expense of the starch, induced by the action of low temperature.

In the case of *Arum maculatum* further observations are required to settle definitely whether the spots are permanent or transitory, whether a plant which bears spotted leaves one year also appears with spotted leaves the next, and also whether plants grown from the seed of spotted plants produce spotted leaves, or, in other words, whether the spots are hereditary.

Stahl, in the paper previously quoted,³ points out that a distinction must be made between spotting or variegation in leaves due merely to the action of the immediate environment of the plant, such as shade and moisture, and spotting which is permanent or characteristic of a particular race or variety of the plant. Thus in *Ranunculus Ficaria* the leaves with dark splashes and light green patches were developed best on plants in moist and shady places. Such plants, however, when removed to a cold greenhouse came up the following year with only the merest traces of these markings.

In the case of the spotted Arum, on the other hand, he says we have to do with a race-peculiarity, and he adds that in the Botanical Garden in Jena both the pure green and the spotted forms retain their characters from year to year.

So far as I have been able to observe, there is no difference in the habitats of the two forms; indeed one finds them, as a rule, growing close together in clumps, but I have not found a spotted and an unspotted leaf on one and the same plant; either all the leaves on one plant are spotted or all plain. The Rev. W. J. Wingate sends me from Bishop Auckland (Durham) a series of leaves illustrating the gradation from leaves plain, through leaves with one spot; spots few and faint; spots numerous but small; spots larger; blotches still larger and more numerous; and finally splashes very large.

¹ Pick. Ueber die Bedeutung des rothen Farbstoffes, &c. *Bot. Centralblatt*, 1883.

² Overton. Beobachtungen und Versuche ueber das Auftreten von rothem Zellsaft bei Pflanzen. *Pringsheims Jahrbuecher*, 1899

³ Stahl, *loc. cit.* p. 174.

Further observations on similar lines are highly desirable.

With regard to the form of the spots, I have observed both the plain flat spots and those in which a pseudo-blister is produced. This bulging of the spot is more often downward than upward, although on one and the same leaf one may sometimes notice the spots both as depressions and as elevations. I have not so far succeeded in finding satisfactory transitions from the flat to the repoussé form of spot; as a rule, either all the spots on a given leaf are flat or all are hollowed, although some of the smaller spots on the leaves with depressed spots are sometimes practically flat.

It is to be noted that in these pseudo-blisters the colouring matter shows as distinctly on the lower surface, or nearly so, as on the upper. I have examined microscopically sections through the spots of a fairly large number of leaves and have never found any trace of insect attack or fungus hypha. The structure of the leaf at the spots differs, in some cases quite considerably, from that of the unspotted portions. In the case of the flat spots the leaf is nearly always slightly thinner at the spot; this is due chiefly to the shorter length of the cells of the palisade parenchyma, and it is these cells and these alone which in this case contain the red colouring matter, hence it does not show through to the lower surface of the leaf. Stahl¹ mentions that he found the anthocyan localised in *Arum* in the spongy parenchyma of the leaf, but does not mention whether the spots were flat or whether they formed depressions. Correlated with the shorter length of the palisade cells of the flat spots is the fact that the whole tissue of the leaf here is slightly looser in texture, thereby causing a rather larger development of the intercellular spaces. This latter point is perhaps more clearly seen in the depressed spots. On cutting sections of fresh leaves the air imprisoned in these spaces produces a quite appreciably deeper blackness at the spot than in the normally green parts of the leaf bordering on it. The anthocyan at the depressed spots is more abundant than at the flat ones; it is often distributed both in the palisade parenchyma and in the spongy tissue of the leaf, but is sometimes confined to the latter. I have not observed it in any case in either the upper or the lower

¹ Stahl, *loc. cit.*, p. 182.

epidermis. As a rule, at the depressed spots the cells of the palisade parenchyma are much shortened (so much so in some cases that one can hardly speak of palisade parenchyma at all), the leaf is considerably thinner, and the contrast between the structure of the spot and that of the surrounding tissue strongly reminds one of that between a "sun-leaf" and a "shade-leaf" of one and the same plant. The cells of the leaf at these depressed spots seem to be rather richer in protoplasm, and to contain rather larger nuclei than the cells of the green part of the leaf.¹ As regards the distribution of the stomata, I counted these over the flat spots and over corresponding green portions near the same spots. The average number of stomata on an area of 0.2 sq. mm. was as follows:—

		spot.	green.
Leaf A.	{ Upper Side,	1.40	1.66
	{ Lower ,,	4.56	5.26
Leaf B.	{ Upper ,,	2.93	2.92
	{ Lower ,,	9.64	9.00

From these numbers it will be seen that there is no relative increase in the number of stomata on the spotted areas. Stahl found that the ends of the leaves in *Sempervivum tectorum* where there is an increase in the number of stomata were specially characterised by the red colour, whereas in *Medicago intertexta* there were fewer stomata on the spots than on the green parts.

Concerning the amount of sugar present in the different parts of the spotted leaves (starch is not formed apparently in these leaves at all), I have not succeeded in determining whether the spots contain more or less sugar than the normal green parts of the leaf, as Fehling's solution rapidly causes maceration of the tissues, and hence the escape of the sugar. I would, however, suggest to any one who is interested in this part of the subject, and who has a good supply of spotted leaves convenient for use, that the spots might be carefully cut out of a number of leaves, weighed, and put into warm distilled water

¹ I do not quite understand Mr. Colgan when he speaks (p. 81) of the cause of these depressed spots being *physical* rather than physiological. Possibly he supposes that the leaf behaves as a thin sheet of metal with a dark spot on it might be expected to do on exposure to radiant heat, namely, that the warmer dark part would tend to bulge owing to unequal expansion. I have discovered no signs of the results of "a system of strains" such as he postulates in the tissues of these spots.

for say 24 hours. The sugar which will have diffused out in this time could be titrated in the ordinary way, and its amount compared with that diffused from an equal weight of the green parts of the leaves treated similarly.

Coming lastly to the function of the spots, Stahl has shown by careful thermo-electric and other experiments that the parts of plants coloured red by anthocyan become slightly warmer than the merely green portions under similar conditions of radiation. Plants with such coloured leaves are developed at their best in the shade of tropical forests where, the air being practically constantly saturated with moisture, transpiration is difficult. The slight increase of temperature at the red portions of the leaf, however, would allow of the evaporation of water at these spots.

In a normal green foliage leaf the structure is that resulting from the necessity of carrying on the two great functions, transpiration and photosynthesis, by the tissues of the leaf as a whole. In a red-spotted leaf there would seem to have been developed a structure admitting of at any rate a partial division of labour, the spotted portions being the better equipped for promoting transpiration. The decreased thickness of the leaf the poor development of the palisade parenchyma, the increase in intercellular space, the increase of surface exposed (in the depressed spots), as well as the presence of the colouring matter itself, all suggest the possibility of increased transpiration at the spots in the leaves of *Arum maculatum*. Whether this is actually the case or not, experiment of course alone can decide.

Can it be that the *Arum* is gradually losing its spots? One finds the plant often in comparatively exposed situations, and even in woods and hedges its leaves are well developed and have been actively at work some time before the unfolding leaves of the trees and shrubs produce any appreciable shade. Does the plant in this island take time by the forelock and, coming up early before there is much shade, dispense with shade requisites, and can we infer from the rarity of the spotted form in Ireland that we are far from being always under a cloud in this country?

THE SPRING RIVALRY OF BIRDS.

SOME VIEWS ON THE LIMIT TO MULTIPLICATION.

BY C. B. MOFFAT.

(Read before the Dublin Naturalists' Field Club, 10th March, 1903.)

IN the present paper I propose to put forward an opinion which I have held for a considerable time, as to what is the real reason why birds—and, perhaps, the higher vertebrate animals generally—do not increase in number from year to year. This question has, I think, always puzzled field observers, the answers commonly given being of that class which look well on paper, but which somehow don't carry conviction so readily when we close our books and look all round us for that visible and tangible evidence which ought, one would think, to be forthcoming. That great tragedy, the "struggle for existence," as pictured for us by Darwin, requires such a death-rate among the young in their first year, or before they are of age to mate, as could not be less than 90 per cent. in the case of most of our finches and other common small birds. For my part, I cannot believe that the theory of Natural Selection—for which I have a great respect, and which I must carefully guard myself against appearing for a moment to call in question—requires this sacrifice, or anything like it. Such a mortality—in fact, a far greater mortality—may very well exist among the young of cannibal fishes, or of reckless multipliers like the insects. But as regards birds I am altogether unable to find grounds for believing in so great a death-rate, at any rate in our own land. It seems to me that, despite all perils, a large proportion, amounting in some species to a majority of those that leave their nest, live. For a number of years I kept count of a small isolated colony of House-martins, from the year in which a single pair bred for the first time until they had become too numerous to be counted. So long as those martins could be counted, my census continued to show that the number which returned in spring was approximately the number which had departed in autumn. This is entirely contrary to what has generally been supposed the common rule; but it satisfies me that the "perils of migration," in the case of the swallow tribe, are

altogether spasmodic. A terrible storm, during the short time of their passage, *may* destroy them in multitudes, just as a terrible winter may wreak enormous havoc among our resident birds at home. But these catastrophes do not occur with such frequency as is needed to account for birds not increasing in "geometrical ratio," and when we look to more ordinary checks on multiplication, while I admit to the full our very meagre knowledge of what those checks are, I say we ought not to accept an unverified assumption that they always work by *killing*.

I think that Darwin, with all his clear-sightedness, did assume this. He kept harping on the doctrine, which seemed to him self-evident, that "more individuals are produced than can possibly survive." In one passage of the *Origin of Species* we are told that "every being which during its natural life produces several eggs or seeds, must suffer destruction during some period of its life, and during some season or occasional year; otherwise, on the principle of geometrical increase, its numbers would quickly become so inordinately great that no country could support the product." "A struggle for existence inevitably follows from the high rate at which all organic beings tend to increase." It is true that in another passage we read that the term "struggle for existence" is used in a "large and metaphorical sense," the real object being "not only the life of the individual, but success in leaving progeny." That distinction is important, and it is one that Darwin never lost sight of as regards plants, which he well knew might live for a long time unfertilised. But it seems to me that it never occurred to him to give it its due consideration as regards animals. He does not consider the possibility of any appreciable number of animals living the lives of old bachelors and old maids. In fact, he explicitly states that there can, in the animal world, be "no prudential restraint from marriage." This, I venture to claim, was too summary a mode of dismissing the question. The main object of my present paper is to show—or at least to make it seem probable—that there are checks of a prudential kind on the marriage of birds, and that these checks may be a very important factor in keeping the number of birds absolutely permanent.

Birds-nesters are, I think, aware that we seldom find in close proximity to each other two nests belonging to the same species of bird. Of course I exclude from this statement birds whose custom is to nest in communities, like the Rook and Swallow. We are aware, too, that cock birds in early spring spend a great deal of their time in fighting one another. No doubt, we are in the habit, when we see one of these fights in progress, of taking for granted that each of the antagonists is violently in love with the same lady. It is not, however, generally supposed that the battles condemn the loser to lasting bachelorhood. Failing to win the bride he has been fighting for would, of course, be something of a disappointment; but the number of hen-birds, so far as we can gather, is fully equal to the number of cock-birds, so that when all the fighting is over, there is nothing to prevent all the birds from marrying and settling down to "live happily ever after." We may suppose, in our sentimental way of looking at things, that even then the poor beaten cock-bird suffers from a certain amount of depression when he thinks of the greater charms of her to whom he first paid court. But we have the assurance of experts that no such thing happens; that one hen-bird is quite as good as another, and that every cock-bird is perfectly content with the first mate he can get. That is sometimes laid down as the reason why hen-birds, as a rule, have not developed bright nuptial colours or melodious voices. The difficulty is to explain why, on such a view, the cock-birds need fight at all. If one mate is as good as another, and there are mates enough for all, the advantage of winning a battle seems hardly worth the discomfort. It has been alleged that the victor gains an advantage in point of time, and so he does, *if it is* an advantage to begin nesting a little earlier than his rivals. But that, it seems to me, is not always any advantage; as far as the progeny are concerned, it may, in a backward season, prove the reverse. Consequently, we are still without adequate explanation why the birds fight one another so hard, unless they have some other object in view than merely to win a mate.

The case would, however, be entirely different if the result of the battle were frequently to prevent the defeated bird from rearing a family in the neighbourhood at all. This would mean to the families of the successful birds, in the early days

of their life, an economic advantage of the greatest value. And this is what seems to me to happen. Birds may, or may not, realise the importance of protecting their future families against the ills of congestion; but they certainly seem to have an instinctive feeling that the patch of ground on which a pair is nesting belongs to that pair, and that no other pair of the same species of bird has any right to attempt to nest upon it. And, as land is a limited commodity, the cock birds in spring have to fight one another to settle the question, which shall possess a particular plot. After each of these battles the beaten bird is driven away; and, unless he succeeds in dislodging another cock from another homestead, all his hopes of matrimony for the remainder of the season seem to be blighted. It is not that he can't find a mate, but that he has no home to offer her; and all his other attractions are, under the circumstances, completely thrown away. The most tune-ful of our birds of song—the Lark, Blackbird, Thrush, and Willow-wren, amongst others—always seem to take the result of a stand-up fight as final. The female Willow-wren, for example, may sometimes be seen sitting by, watching the combat between two males of her species, at the close of which the victor drives the vanquished away, and the lady then throws in her lot with the conqueror as a matter of course. When we see courtship on this mechanical method always triumphant, even in the case of so beautiful a songster, I think we must infer that there is very little free choice or æsthetic selection, and that the hen bird is mainly guided by prudential motives in accepting the owner of the soil.

Before going further on this subject, I would like to quote a few instances which prove what a violent objection cock birds have in spring to the mere presence of other cock birds of their own species in certain spots. One morning in March, 1898, at my home in county Wexford, I was told that a Blackbird had lately been behaving in a very extraordinary way. It used to come every morning to the kitchen window, and continue for five or six hours at a stretch dashing itself against the glass. At first people thought it would break the window, but as this didn't happen they got quite used to it; and the "thudding" went on day after day, all through the forenoon and early afternoon, as monotonously as clockwork. I went to see this wonderful Blackbird, and found that its action was

exactly that which cock birds adopt in fighting. In fact, it was obviously doing battle with its own reflection in the glass. For this purpose it repaired to the same window every morning during the whole of March, and the greater part of April. It never, so far as we could make out, noticed itself, or looked for itself in any other window—but used all its energies against this particular one. I need scarcely say it was a fine cock Blackbird, and we found that there was a Blackbird's nest about ten yards away from the spot where these daily battles went on.

Towards the end of April the Blackbird made peace with his similitude in the glass ; but before the end of February, 1899, we found that hostilities had begun again, and in March of that year another feud broke out of the very same kind. One morning in March, 1899, I was surprised to hear what sounded suspiciously like the Blackbird battering himself at a window at the other side of the house, and after several unsuccessful attempts to stalk the performer at this window, I found it was a cock Chaffinch, who had an antipathy to his reflection showing itself in the window of a storeroom. So all through the spring of 1899 we had two daily battles going on. And in the third spring, the spring of 1900, it was exactly the same, the "crazy Blackbird"—as he was called—fighting himself at one side of the house, and the equally infatuated Chaffinch doing the same at the other. After that year, I regret to say, we saw the Blackbird no more ; but the cock Chaffinch resumed his campaign at the storeroom window with unabated energy in the spring of 1901.

Now, in these two cases it is evident that the imaginary enemies, on whom so much fury was expended, were guilty of no crime beyond that of being in the spot where they were. They had paid no presumptuous address, had uttered no song, challenge, or love-note, and had never taken the slightest notice of the fair partner of either of their angry antagonists. The whole sum and front of their offending was being where they were. The imaginary Blackbird was in the demesne attached to a real Blackbird's nest ; the imaginary Chaffinch was in the demesne attached to a real Chaffinch's nest. The real Chaffinch and the real Blackbird were resolutely determined to expel the trespassers ; and the trespassers, although

they never took the initiative in attack, were stubborn in defence, and would not go.

These two cases—within one very small area—show plainly, I think, what would occur if two pairs of Blackbirds or two pairs of Finches attempted to build very near to one another. The cock birds would almost certainly fight, and the weaker would either be killed or retreat. This practically is the view which was taken a hundred and thirty years ago by Gilbert White, when he wrote that in spring “such a jealousy prevails between the male birds that they can hardly bear to be together in the same hedge or field”; and “it is to this spirit of jealousy,” added White, “that I chiefly attribute the equal dispersion of birds in the spring over the face of the country.” This was written before much attention had been drawn to the all-important question, why does not the multiplication of living creatures proceed at such a pace as to overstock the earth. But I venture to say that so far as birds are concerned it supplies in itself an adequate answer. For, in course of time, the country—or the parts of it suitable for nidification—would come to be completely parcelled out between the birds, each parcel of land belonging to a particular pair:—I mean, as against any other pair of the same *kind*. And, once that happy state was arrived at, the number of nesting pairs each year would be exactly the same, the number of nests and the average number of young birds reared would be exactly the same; and whether there was a large mortality in winter, or a small mortality in winter, the total number of birds in the country would remain exactly the same. As long as the annual birth rate, or rather *number* of births, is constant, and has been so for a given number of years, it must be balanced by the annual death rate, and further increase of the species becomes impossible.

Suppose, for example, that ten pairs of Chaffinches have nested every year in one orchard, and that every suitable nesting tree in the orchard stands on ground belonging to one or other of the ten. If this has gone on for a period equal to the average life of a Chaffinch, it follows that the number of Chaffinches of the original stock that die every year of old age would exactly equal the number hatched every year, supposing that no mortality at all had taken place among young birds. Thus, though we may suppose that about forty young would

be reared every spring by the ten pairs, there would be no increase in the total number, because each year forty old birds would have reached the end of their span of life, and the loss would, therefore, exactly counterbalance the gain.

I now approach what seems to me the crucial point involved in this question. If I am right in thinking the country is "parcelled out" in the way I have described, it appears to follow that we must have a very large number of non-breeding birds of both sexes, prevented from breeding simply by the fact that they have no suitable ground. Have we any evidence that this large reserve exists? And if we have, can it be explained on any other hypothesis than the one I have suggested?

Nearly every standard work on ornithology contains some curious cases of the great facility with which a bird that has been deprived of its mate in the nesting season gets another. Gilbert White tells Pennant that at Selborne he found it useless trying to check the usurpations of the Sparrows on his House-martins' nests by shooting the offending birds; for the one which was left, he says, "be it cock or hen, presently procured a mate, and so for several times following." Our great Irish naturalist, Thompson, relates of the Peregrine Falcon in this country, that "if either an old male or female be killed in the breeding season (not, he adds, an uncommon circumstance), another mate is found within a very few days, so that the eyries are sure to turn out their complement of young." Dr. Jenner records how one of a pair of Magpies was shot from a particular nest no less than seven times on consecutive days, but all to no purpose, and the last pair reared their young. A similar story has, I think, been more recently recorded of the Carrion Crow. Darwin was told that Sir John Lubbock's game-keeper had repeatedly shot one of a pair of Jays, and had never failed shortly afterwards to find the survivor re-mated. "I could add," continued Darwin, "analogous cases relating to the Chaffinch, Nightingale, and Redstart." The illustrious author of the *Origin of Species* (in whose work on *The Descent of Man* most of the foregoing examples are circumstantially noticed), then proceeds to quote what I must call the most remarkable instance of the whole remarkable series. He had been informed by his correspondent, Mr. Engleheart, that

that gentleman "used during several years to shoot one of a pair of Starlings which built in a hole in a house at Blackheath, but found that the loss was always immediately repaired. During one year Mr. Engleheart kept an account, and found that he had shot thirty-five birds from the same nest; these consisted of both males and females, but in what proportion he could not say. Nevertheless, after all this destruction a brood was reared."

I think it appears to be established by such records as these that there is a reserve of non-breeding birds, and, moreover, of birds perfectly willing to breed—and that they are of both sexes. The puzzling question is, why don't they breed until vacancies occur in the partnerships already existing?

This question occurred to Darwin when he was working at the subject of "Sexual Selection." "How is it that there are birds enough ready," he asks, "to replace immediately a lost mate of either sex?" He considers several possible reasons, such as that some birds are mateless through having had their nests destroyed, or their partners killed; and that some have mates for whom they do not particularly care. But these explanations, as Darwin at once saw, were of little value; for if, as he goes on to express it, "so many males and females" are "always ready to repair the loss of a mated bird," it is impossible to refrain from asking, "Why do not such spare birds immediately pair together?" And to this question Darwin suggests the answer, which he gives as his final clue to the difficulty, that these unmated birds—though all of them willing for matrimony in the abstract—are not individually pleasing to one another, and, therefore, will not have one another for husband or wife.

Now this is a rather romantic explanation, which, I fear, will not stand the cold light of arithmetic; because it is as certain as any arithmetical fact can be, that if you shoot *one* of a pair of nesting birds thirty-five times, or even half-a-dozen times, during the season, and kill birds of both sexes, you will have killed both the original members of the pair, and therefore the two who are living together, a happy husband and wife, at the close of the season, must be two of the very lot who "*ex hypothesi*" (as the Mathematicians say) were "not pleasing to one another." So the romance of the situation seems to vanish. Not only, we find, are these non-

breeding birds willing for matrimony in the abstract, but they are equally willing, provided certain conditions occur, to marry one another.

To take an illustration : A pair of Starlings, whom we will call A and B, nest in a particular crevice. Five other Starlings, C, D, E, F, and G, live in the vicinity unmated, because, though of different sexes, they all fail to please one another. One morning a cruel man shoots A ; and B, the same evening, has found a new mate, who, according to our supposition, must be either C, D, E, F, or G. Suppose it to be C. There is nothing remarkable so far, because, though C didn't please D or F, he may well enough please B. But the next morning the cruel man shoots B ; and C, before sunset, has a mate in B's place. Now this must be either D, E, F, or G ; but only yesterday morning C was living unmated, because of his inability to please D, E, F, or G. How is he able to please them now, when he wasn't able a day or two ago ? I contend that we must give the very unromantic answer—he is able to please them now, because he has a bit of land.

I admit, however, that the case of the Starling, if it stood alone, would be a bad instance, because Starlings are, to a certain extent, sociable in the breeding season, and therefore the competition which evidently occurs between different individuals or different pairs may rather be for access to a particular nesting-hole, than for proprietary rights in the surrounding area. Where birds learn to breed in communities the form of their rivalry, of course, becomes modified ; but that it is still territorial seems to me the only natural explanation of many observed facts. In old established bird-communities the accommodation is often obviously limited. The individuals belonging to the community cannot all nest in the space occupied. For example, we have a small rookery, confined to two trees, on the lawn at Ballyhyland. In a spring in which the number of nests in this rookery did not exceed thirty-five, and before any young birds of the year were fledged, I have several times put out of these two trees, by clapping my hands underneath, flocks of more than two hundred rooks. Within the rookery itself, then, there must be non-breeding birds, and there must be competition for space. In the instance mentioned the non-breeders must have been twice as numerous as the breeders. But again, outside

the rookery, there would be rivalry if another rookery was started within a certain radius. That has frequently happened, and I remember a case myself in which some Rooks attempted for several years to form a new rookery which was always pulled to pieces by the inhabitants of a more anciently established one. In another case, however, not far from the same spot, a few pairs of rooks succeeded, one spring, in building without molestation in a new site. Of this experiment, two facts deserve notice. Firstly, the nests were not built till about the end of April, when the birds of the older colony were busy feeding their full-fledged young; and secondly, the success was very short-lived, for at the commencement of the following spring the rooks of the old rookery came in force and carried away the sticks from the new one to rebuild their own nests, and thus the infant colony came to an end. Whatever was the motive here, it shows that to found a new rookery near an old one is no easy matter.

I will now mention another case of a bird that failed in its matrimonial hopes, although the failure was not exactly illustrative of the sort of competition I consider to be the common rule. At Ballyhyland we have no Sparrows. Consequently, the arrival of a pair of these birds in the farm-yard in the spring of 1898 excited some interest; more especially as on the very first day of their visit they attempted to gain possession of a House-martin's nest with the obvious intention of making it their own. The House-martin is not so powerful a bird as the Sparrow, but there were four pairs of House-martins nesting in the yard, and the eight Martins at once combined and beat the Sparrows away. On the following day the two Sparrows were still ranging about the place, but no sooner did the cock-bird show himself in the neighbourhood of the row of Martins' nests than he was again attacked and mobbed so severely that he retired to the other end of the yard. He then set covetous eyes on another nesting site, but that happened to be occupied by a pair of Blue Titmice. I regret to say that I was not present as a spectator of the engagement which followed, but I am told by one who was—and I can well believe the assurance—that the battle between the Titmice and the cock Sparrow was very fierce. The upshot, however, was that the aggressive cock Sparrow once more suffered a bad defeat. And from that day the *hen* Sparrow was

seen in the yard no more. She had not participated in the fighting, but she saw no use, it would seem, in remaining with a husband who couldn't win a nesting site for her. The unfortunate cock Sparrow remained in the yard all through the spring and summer, perched usually on a high roof-top where he evidently regarded himself as possessing a small domain, and where we used to hear him chirping a plaintive challenge all through the day. Why, it may be asked, did he not follow his mate? I can only suggest that he saw more chance of securing a nesting site where he was than by going elsewhere to ground already in the occupation of other Sparrows. Probably he was right, if he had only used his opportunities, when he had them, a little more judiciously; but the incident shows that competition for territory sometimes occurs between birds of different species, and in that form undoubtedly prevents certain individuals from breeding at all.

It would not be hard to collect a good many cases more or less parallel to the one I have just mentioned. For example, many cases are on record of rivalry between Herons and Rooks for possession of trees in which to breed. At Tintern, in county Wexford, a war which lasted, I am told, for a considerable number of years was waged between these two species for a clump of old trees which they both wanted to build in. Hundreds of Rooks, I am assured, were killed by the Herons before the question was settled, but in the end it was settled by the victory of the persevering Rooks. Again, the Starling has to defend its territory against the Swift, and I remember coming suddenly on a pair of Starlings which had struck a full grown Swift down on a grass plot and appeared to be on the point of killing it when my arrival interrupted them. But a more remarkable case of enmity is that between the Missel-thrush and the Blackbird. On two separate occasions I have seen a Missel-thrush during the nesting season flying along carrying a murdered or half murdered Blackbird in his talons, just as a Hawk would do; in each case the bird was carried several hundred yards, and then dropped in the middle of a field—in one case dead, in the other mangled beyond hope of recovery. The Blackbird's only imaginable crime was that he had intruded, or perhaps attempted to sing,

on a part of the Missel-thrush's property. When such is the animosity shown by birds in spring against individuals who are not of their own species at all, it is not hard to understand how the rivalry of those which are of the same species gradually results in a certain parcelling out of the country, and substitutes arithmetical for geometrical progression as the normal avian birth-rate.

There remains a collateral point on which I think I should touch. The advocates of what is called Sexual Selection will probably say, in opposition to what I have tried to advance, that it offers no explanation of the beautifully ornamental plumage in which so many male birds are arrayed, or of the sweet flow of song with which, in a still larger number of cases they delight our ears in spring. If the great difficulty of a cock-bird in spring is to get a plot of ground, and his prospects of matrimony are dependent on that, why, it will be demanded, should he need to have a fine voice or fine feathers? If his difficulty is to make himself pleasing to somebody else, the explanation is simple. The song and bright plumage of a cock-bird are, on this theory, the charms by which he establishes his place in the heart of her to whom he pays court. But how do they help him to win a plot of ground?

Well, as regards song, it has long been a subject of controversy whether or not it is addressed to the female at all. So far as outward indications go, male birds appear to address their songs primarily to one another. We hear them answering one another from field to field, sometimes from hill to hill, and the song partakes so strongly of the nature of a challenge that a great many birds actually sing while they are fighting. The Robin almost habitually does so; and the Wood-pigeon's peaceful "coo"—as it sounds to our ears—is often uttered in the midst of a deadly combat. I have also heard Thrushes singing their loudest in the thick of a fray; and Mr. Charles Witchell, the author of the *Evolution of Bird-Song* has noticed the same habit in the Tree-pipit, Chiffchaff, Willow-warbler, and Golden-crested Wren. But it is still more usual for song to provoke to combat, and here I think the general rule is accurately stated by the ornithologist Couch, who observes that "in a wild state birds of the same species will not sing near each other, and if the approach be too close, and

the courage equal, a battle follows." I need scarcely add that bird-catchers take advantage of this fact to catch male birds in spring; and it is by playing upon the same propensity that boys in the country decoy the male Corncrake from his cover, by imitating his "crake" with a stick drawn across a comb. That it is the male, not the female, Corncrake who is thus decoyed, is shown by the fact of its craking in reply to the challenge, up to the very moment of leaving cover.

The chief and primary use of song, then, as I conceive it, is to advertise the presence in a certain area of an unvanquished cock-bird, who claims that area as his, and will allow no other cock-bird to enter it without a battle.

The question may be asked, is not bird-song too elaborate to be thus accounted for? Would not simpler notes answer the purpose equally well? I think it may be shown that the more elaborate singers do, however, obtain an advantage in this manner. Since only the unvanquished bird has an area to sing in, the vanquished birds must, after their defeat, observe silence, while the conqueror, secure in his holding, sings triumphantly on and on, his voice and his powers of expression naturally improving by practice, and thus proclaiming to all who come within the charmed circle of his audience what a lot of practice he has had. Thus, all over the country, the finest singers are known from their superior vocal power to be those with the longest record of success in life, and the poorer singers are naturally afraid to start competition with them. This, of course, renders their tenure of power more secure than ever.

And, in the matter of plumage, although it has been shown by careful accumulation of evidence that birds of polygamous character—and even some monogamous species—behave very much as if the female had a taste for the beautiful; and it seems unreasonable to doubt that the bright tints acquired by the more richly ornamented males are agreeable to her eye, it does not follow that that is their primary value. Darwin, in summarizing his evidence on this subject, makes the interesting statement on Mr. Jenner Weir's authority that "all male birds with rich or strongly characterised plumage are more quarrelsome than the dull coloured species belonging to the same groups." Have we not here some ground

afforded us for suspecting that the bright plumage may have been originally evolved as "war paint?" In other words, as a sort of "warning colouration" to rival males, rather than attractive colouration to dazzle the females? I cannot, of course, go into elaborate argument on this question, but I wish to observe that I never, to my recollection, saw a conflict between two brightly-plumaged birds, in which the bright feathers were not brought into prominence in some striking manner during the fray. The Robin so faces his opponent as to make the fullest display of his red front; the cock Golden-crested Wren lowers its head like a bull, and flashes its crest right in the enemy's face. The distinguished points in the Water-hen's nuptial dress are not so much in the plumage of this bird as in its bright orange bill, and the bright scarlet-orange band round its leg, which is often called its garter; and it is significant that when two Water-hens fight in the breeding season they sit back on their hind quarters and strike at one another with their feet. The male of the Night-jar is distinguished by the white patches on his wings and tail, which only show when these are extended; and two birds of this species whom I once watched fighting used to lie on the ground, menacing one another with deep frog-like noises, and then to rise with vehement beating of wings, which showed to perfection—even in the dim light—the white ornamentation of their plumage. I need hardly mention the notorious case of the Ruff, whose decoration is really useful as a shield in his very celebrated battles. These are just a few illustrations of what seems to me to constitute a general rule, and they serve to show that bright colours have another object than to please the hen bird's eye. When we pass in spring over a gorsy Irish moor, and see those splendid little birds, the cock Stonechats, perched conspicuously on the tops of the furze bushes, does not each of them remind us of a bright little flag, put up—as it were—to mark that such and such an area is under such and such a dominion? If the cock bird shared the dull plumage of the hen, the signal would be less useful in two respects; it would not be seen so far, to begin with, nor would it show—when it was seen—that the bird belonged to the fighting sex, and was of full age to maintain his right. Without, then, wishing to push

argument on this subject too far, I say these bright colours—apart from what is called Sexual Selection—are means to a definite end; they are means by which cock birds impress certain lessons on one another, and if they do not help a bird to *win* his plot of ground, they, at any rate, render his subsequent possession of it less liable to disturbance. In other words, it appears to me a general conclusion from the facts on which I have sought to lay stress, that those effects which are commonly ascribed to Sexual Selection are capable of being explained by a form of Natural Selection, and that Natural Selection—on the other hand—does not, so far as birds are concerned, require, as Darwin took for granted, a wholesale annihilation of the weaker young, but can, and probably does, largely work by condemning to unproductiveness the less powerful adults.

Ballyhyland, Wexford.

NOTES.

BOTANY.

The Leaf-Marking of *Arum maculatum*.

In connection with the subject of Leaf-marking in *Arum* in *Irish Naturalist*, herewith find enclosed plant from Bray. Referring to the lacerated state of the specimen, I may remark the damage was done in exactly twenty-four hours by a pair of *Meloe violacea* that I turned loose into the vasculum. The missing portion, including 3-4 inches of succulent stem, besides flowers of *Nepeta Glechoma* and leaves of *Stellaria Holostea*, was actually eaten in that time, showing what depredations a few of these beetles are capable of. When taken they were feeding voraciously on the foliage of *Ranunculus acris*, within a couple of feet of each other.

W. BALFOUR BRUCE.

Bray.

[The specimens sent include two leaves of the usual spotted form, the blotches being flat, and what is of greater interest, a young spathe that is similarly spotted, being the first time, I believe, that spotted inflorescence has been actually noticed in Ireland.—R. L. P.]

ZOOLOGY.

Hybernation of Queen Wasps.

I have never seen mention made in any book on the subject of the position assumed, in certainly the majority of cases, by Queen Wasps while hybernating. During this period, from the end of November to end of April, the queen wasp, as is well known, passes the time hidden away in holes and crannies.

I have come across a good many during the past winter, and found most of them were suspended entirely by their mandibles, the antennæ being folded down and covered by the first pair of legs, and the wings, in place of being folded above the abdomen, were folded along underneath it, and were covered by the second and third pair of legs. In the few cases in which they were not hanging in this way by the mandibles, some, I think, had been disturbed before I found them, but I do not feel sure that it is an invariable custom.

Mons. Ch. Janet, in a recently-published paper on wasps, mentions the position of the wings while hybernating, but does not refer to the other facts, which seem sufficiently curious to be worth recording.

DENIS R. PACK-BERESFORD.

Fenagh House, Bagnalstown.

Two Beetles from Roundstone, new to the Irish List.

Amongst the insects I collected last September at Roundstone, there are two not previously noticed from Ireland. *Longitarsus flavicornis*, Steph., was taken by sweeping near the small lake between Roundstone and Dog's Bay. *Myllena Kraatzii*, Sharp. (one specimen) was found half-way up Errisbeg. Both species were identified by Mr. Champion.

GEORGE W. CHASTER.

Southport.

The Irish Black Rat in England.

I send for record the names of two English localities for the black form of *Mus decumanus*, which William Thompson named *Mus hibernicus*. The first is Buckhurst Hill, Epping Forest, where, as Mr. William Cole, the curator of the Essex Museum, informs me, specimens are "very rarely" obtained. The second is Exebridge, Tiverton, Devon, whence I have examined specimens caught by Mr. T. F. Tracy at the premises of the Exe Valley Fishery. A good many black individuals have been noticed amongst the ordinary rats at this locality during the past three years. Some of them possessed the white breast spot of Thompson's type.

G. E. H. BARRETT-HAMILTON.

Kilmanock, Arthurstown, Waterford.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include four Badgers from Mr. R. J. Ussher and Mr. M. H. Foy ; a number of Mirror Carp from Mr. B. J. Clibborn ; a Macaque from Mrs. Morris ; and two Boa Constrictors from Sir Bryan Leighton. The Sirdar of the Egyptian Army has intimated his desire to present a Giraffe to the Society. A fine pair of young Orang-utans have been received in exchange for a pair of young Lions. They are the only specimens of this interesting Anthropoid Ape at present living in the British Islands, and they should attract many visitors to the Dublin Gardens. A number of subscriptions have been received towards repairing the damage caused by the recent storm. *

DUBLIN MICROSCOPICAL CLUB.

APRIL 8.—The Club met at Leinster House.

Mr. WILLOUGHBY D. DADE exhibited *Cristatella mucedo*. This Polyzoon differs but little from *Lophopus* shown at the previous meeting of the Club, except that it is truly locomotive, and is remarkable as being the only species of the Polyzoa, marine or fresh water, which possesses such powers. The specimens shown had been only recently hatched from "statoblasts," and were possessed of but one or two polypides. As the season advances, however, the colony increases by gemmation, and ultimately *Cristatella* looks like a small caterpillar, covered with beautiful horseshoe-shaped plumes, the whole being as Allman states, "an object which, in elegance, can hardly be surpassed."

Mr. MOORE exhibited some of the floral leaves of minute Orchids to illustrate the distribution of the coloured portions in the flower. From examination of a large number, it was found that colouring occurred in local patches, in lines following the veins, or in papillae above the surface of the floral leaf. Specimens, to illustrate these three modes of colour distribution, were shown.

Mr. M'ARDLE exhibited *Lejeunea hamatifolia*, Hooker, which was collected by Mr. J. Hunter on damp rocks by the River Trillick, Buncrana, Co. Donegal, in March last. He also showed specimens found on Connor Hill, Co. Kerry, bearing the curious perianths, which are five-angled ; the angles are setose-spinose, and are rarely seen. The species is easily identified by the long acuminate, serrated, antical lobe of the leaf. The plant is interesting as being the British representative of the American sub-genus *Drepanolejeunea*, of which Dr. Spruce describes eight species in his "Hepaticæ of the Amazon and Andes." He also showed a copy of Mr. Alexander Evans' "Hepaticæ of Puerto Rico," a reprint from the *Bulletin of the Torrey Club*, January, 1903, which deals with *Drepanolejeunea* in which ten species are described with six plates.

BELFAST NATURALISTS' FIELD CLUB.

APRIL 28.—ANNUAL MEETING.—The chair was occupied by W. J. FENNEL, Vice-President. The Secretary read the annual report, which dealt with the ordinary work of the Club, and detailed the special labours undertaken by the members in connection with the recent visit to Belfast of the British Association for the Advancement of Science. The summer excursions of the Club were to Glenarm, Stormount glen, Newry, Enniskillen and Lough Erne, Giant's Ring, Monkstown and Ballyclare, and Gobbin's cliff path. The average attendance at these excursions was well sustained. The winter session was inaugurated by a successful conversazione in the Exhibition Hall on the 12th November. During the winter months the evening meetings were held, and a number of papers were read by members and friends. On 31st October the Vice-President gave an "at home," inviting all the members of the Club to meet Sir Harry Johnston, K.C.B., who gave an interesting account of his travels in Uganda. The Club was invited in December to co-operate with the Queen's College and Natural History Society in forming a society for the special study of marine biology. This resulted in the formation of the Ulster Fisheries and Biology Association, on the Council of which the Club is represented. In connection with the competition for the prizes offered by the Club, W. A. Green was awarded a prize for photographs of archæological subjects. A short synopsis of the work done by the Club in connection with the British Association meeting was then given. The movement to invite the British Association to meet in Belfast had been formally initiated at a committee meeting of the Club held in the Museum on 10th December, 1897. All the officials and many members of the Club were elected on the Local or Citizens' Committee; some occupied responsible positions on various sub-committees, notably on the Publications or Handbook Committee and the Excursions Committee. The movement for the preparation of the handbook had been originated by the Club. They had representatives on the General Committee of the British Association and on many of the sectional committees. The two Secretaries, J. St. J. Phillips and Robert Patterson, were elected respectively secretaries of Section C (geology) and Section D (zoology). An ex-President (Rev. C. H. Waddell) was a secretary of Section K (botany). During the Association week the Club, represented by William Gray, organised and conducted several afternoon excursions. After the official meetings were over, the Club conducted one-day trips to Downpatrick and the Gobbin's cliff path, and a four-day excursion to the Antrim Coast and Giant's Causeway. All these excursions had been largely attended and much appreciated. In connection with Section C, J. St. J. Phillips organised and carried through four afternoon and one whole day excursions. Rev. C. H. Waddell conducted Section K on an excursion to Colin Glen. The Treasurer (W. H. Phillips) submitted his annual balance-sheet, which showed a satisfactory condition of the finances. Reports from the Librarian and the Botanical Section were

also submitted. On the motion of the Chairman, seconded by John Vinycomb, the reports were adopted, and ordered to be published in the usual course. As the result of the election of officers, the following were declared office-bearers for the Session 1903-1904:—President, W. J. Fennell, M.R.I.A.I.; Vice-President, Professor Symington, M.D., F.R.S.; Treasurer, W. H. Phillips; Librarian, George Donaldson; Secretaries, Robert Patterson and Nevin H. Foster; Committee, F. J. Bigger, George C. Gough, Alex. Milligau, H. Lamont Orr, J. St. J. Phillips, George Reilly, John Vinycomb, Robert Welch, Professor Gregg Wilson, and Joseph Wright. The Chairman proposed a vote of thanks to the outgoing Secretary, J. St. J. Phillips, which was duly acknowledged. The President referred to the retirement of two members of Committee—William Gray and S. A. Stewart. These gentlemen had greatly contributed to the success of the Club by the active interest they had taken during many years' official connection with the Society. Various suggestions were received as to the better working of the Club, and to increased and improved library accommodation being acquired. These suggestions were referred to the new Committee for consideration. Recommendations as to places suitable for the summer excursions were received, and referred to the incoming Committee. The election of four new members brought the meeting to a close.

MARCH 13.—BOTANICAL SECTION.—This section met to continue the investigation of the Ferns of the N.E. district. N. Carruthers ably conducted. The evening's work brought to a conclusion the programme undertaken for the winter session.

DUBLIN NATURALISTS' FIELD CLUB.

APRIL 11.—WINTER EXCURSION.—A party numbering twenty-two, conducted by D. Houston, F.L.S., visited the Bulb Farm at Rush, and a most enjoyable time was spent in studying the various type of Daffodils and Tulips. By the kindness of Mr. Robertson, of Messrs. Hogg and Robertson, the owners of this well-known farm, the members and their friends were entertained to tea at the close of the afternoon.

APRIL 15.—The sixth business meeting was held, J. ADAMS, B.A. in the chair. Twenty-six members and visitors were present.

R. LL. PRAEGER read a paper, *a propos* of the forthcoming long excursion, on "The Flora of County Limerick," which was illustrated by dried specimens of noteworthy plants.

Dr. PETHYBRIDGE read a paper on "Red Colouration in Plants," illustrating it by diagrams and by fresh specimens. At the close of the meeting the complementary nature of the absorption spectra of anthocyan and chlorophyll solutions was shown on the lantern screen.

Mr. Praeger read a communication from R. J. USSHER relative to the extermination of the Kite in Wales. It appears that the nests of the few remaining pairs of these birds are persistently robbed during the breeding season, and that a Mr. Head of Dollymount was one of those who indulged in this scandalous practice. The Committee was instructed to

take the matter up and to protest in the strongest possible manner against the vandalism, and to do all in their power to assist in preserving the Kite from almost certain total extinction in the British Islands.

The Secretary read a letter from J. L. COPEMAN, Secretary of the Cork Naturalists' Field Club, asking for assistance in organising an exhibit of Field Club members' work at the forthcoming Cork Exhibition.

H. J. SEYMOUR sent flowers of *Polyanthus* for exhibition in which the calyx was becoming foliaceous and petaloid, and the corolla tending to become absorbed. Somewhat similar malformation was exhibited in a wild primrose sent by Miss MAHAFFY.

J. ADAMS exhibited a series of spotted leaves, chiefly of the *Ranunculaceæ*, as well as some leaves of *Arum maculatum* attacked by fungi.

D. HOUSTON gave a short account of the excursion to the Bulb Farm at Rush, and exhibited a number of named varieties of the Daffodil.

M. J. Van Steenberge and F. J. C. Skeffington, M.A., were elected members, and R. Southern, R. J. Griffin, and J. Duffy, associate members. J. A. Henderson was proposed for membership.

MAY 2.—THE ROYAL CANAL.—This excursion, under the conductorship of D. Houston, F.L.S., was attended by 22 members and visitors. Leaving Cross Guns Bridge at 2.30 p.m., the party walked along the Royal Canal as far as Broom Bridge. A number of water plants were obtained from the canal, including the *Algæ Chatophora pisiformis* and *Batrachospermum moniliforme*. From Broom Bridge the party proceeded to the valley of the Tolka, where some striking sections of Boulder clay on Carboniferous limestone were observed. At Finglas-wood Bridge *Lithospermum arvense* was obtained. Return was made by road to Cross Guns. J. A. Henderson was elected a member of the Club.

CORK NATURALISTS' FIELD CLUB.

APRIL 22.—ANNUAL MEETING.—J. NUNAN presided. W. B. Lacy (for J. L. Copeman, sec.), read the following report:—

Your Committee have to report that the membership stands at 67, including 10 honorary members, as compared with 63 last year. The Cork International Exhibition being held, it was decided that no excursions into the country should take place, but the members had several very interesting and instructive ones to the Exhibition, when demonstrations in several branches of science were given by lecturers connected with the Department of Agriculture and Technical Instruction. Our lectures were three in number, as follows:—Mr. James Porter, B.E., on "Recent Geological Research in County Cork"; Mr. W. H. Phillips, Belfast, on "Ferns," and Professor M. Hartog, D.Sc., on "Mosquitoes and Malaria"—this was held jointly with the Literary and Scientific Society. The Committee decided to allow the subscription of 5s. to cover two years, owing to the Exhibition interfering with the usual field excursions. The Field Club, through the hon. secretary, offered to help in the Greater Cork International Exhibition, which help has been heartily accepted,

and an important section allocated to them. It is hoped that every member who can possibly aid will come to our assistance, as the work is heavy, and the credit of our Club at stake. The Field Club Union, through Mr. R. Lloyd Praeger, has promised help, and we hope that our exhibits and lectures will form an interesting feature in the forthcoming Exhibition. In view of this, it is probable we shall have to again forego any country excursions for another summer, but if individual members can bring any fresh objects of interest we shall be glad to receive them and to find a place for their display in our section.

A letter was read from G. H. Pethybridge, Secretary of the Dublin Naturalists' Field Club, asking the Cork Society if they would join in the excursion, either to Limerick or Kilkenny, to take place in August next.

The matter was referred to the Committee.

On the motion of C. Peyton, seconded by F. Rohu, the following officers were re-elected:—President, Professor Hartog, D.Sc.; Vice-Presidents, Thomas Farrington, M.A., F.C.S.; J. L. Copeman, R. A. Phillips, J. H. Bennett, H. H. Lund, and Miss Martin. Treasurer, W. B. Lacy. Curator, W. H. Johnson. Secretary, J. L. Copeman. Committee:—A. Coulthart, B.Sc.; F. R. Rohu, J. Nunan, and Mrs. Hughes.

ULSTER FISHERIES AND BIOLOGY ASSOCIATION.

MARCH 24.—This Association was formally inaugurated at a public meeting held in the Museum, Belfast, on March 24, the Earl of Shaftesbury presiding, supported by the Lord Mayor and the President of Queen's College. The attendance was large and representative, and the proceedings enthusiastic. The resolution forming the Association was moved by President Hamilton, and seconded by Professor Gregg Wilson in an able address, in which the aims and claims of the Association were put forward. Other speakers included Sir Robert Lloyd Patterson, Professor Symington, the President of the Belfast Natural History and Philosophical Society, the President of the Belfast Naturalists' Field Club, the Editor of the *Northern Whig*, etc., etc. Lord Shaftesbury was elected Patron, and Hugh H. Smiley President of the Association, and Robert Patterson Honorary Secretary and Treasurer. A strong Council was elected, and a vote of thanks to the chairman terminated a most successful meeting.

At the first meeting of the new Council, President Hamilton was elected Chairman, and Mr. Wm. Swanston Vice-Chairman of the Council, while Professor Gregg Wilson was appointed Honorary Director. About 110 members and associates have joined the Association.

During the Easter holidays Professor Wilson brought a party of 15 to Larne Harbour, where, in spite of the wintry weather, four good working days were spent. Dredging operations were carried on by day, while Dr. Wilson gave lectures and demonstrations in the evenings. Many members were started on their different groups, and much profitable work was done.

18

FORAMINIFERAL, HIGH-LEVEL, BOULDER CLAY,
IN THE COUNTY OF DUBLIN,
AND IN DUMFRIESHIRE AND AYRSHIRE;
WITH OBSERVATIONS ON THE ORIGIN OF BOULDER CLAYS.

BY JOSEPH WRIGHT, F.G.S.

IN 1873 Rev. Maxwell Close, F.G.S., read a paper before the Royal Geological Society of Ireland, on "The Elevated Shell-bearing Gravels near Dublin."¹ In this paper the author records the occurrence of molluscan shells in the sand and gravel beds at Ballyedmonduff, at an elevation of 1,000 feet above the sea, and at Caldwell Castle, at an elevation of 1,200 feet. Five years later I visited the former locality, and brought away a small quantity of the finest of the material for microscopical examination; the shell fragments through it were much worn by exposure to the weather.² The following Foraminifera were obtained:—

Millolina Boueana (d'Orb.)?—Rare.

Polystomella crispa (Linné).—Rare.

P. striato-punctata (F. & M.).—Rare.

Nonionina depressula (W. & J.).—Common.

A few months ago I received from Mr. H. J. Seymour, of the Geological Survey of Ireland, two packets of Boulder clay, which he kindly got for me from Mr. J. de Witt Hinch, of the National Library, Dublin. They were from Rockbrook and Larch Hill, County Dublin.³ The following is a list of the Foraminifera:—

ROCKBROOK.

Boulder clay, Rockbrook, 500 feet above the sea. Weight of clay, 24·8 oz. Troy. After washing, 7·2 oz. fine, 4 oz. coarse,⁴ stones angular and rounded, some of them very much rounded as if they had been so formed on an exposed sea beach. Foraminifera most abundant.

Milliolina seminumum (Linné).—Very rare.

Verneuilina pygmæa (Egger).—Very rare.

¹ *Journ. Roy. Geol. Soc. Ireland*, vol. iv., new series, pp. 36-40, 1873-77.

² *Proc. Belfast Nat. Field Club*, 1879-80, app., p. 156.

³ For information regarding these clays, see "A Contribution to Glacial Geology of County Dublin," by J. de Witt Hinch, *Irish Naturalist*, October, 1902.

⁴ The sieves used for washing the clays were a galvanized wire sieve, 16 meshes to the linear inch, and a miller's silk sieve, 150 meshes to the linear inch.

- Bullmna marginata**, d'Orb.—Very rare.
B. elegantissima, d'Orb.—Very rare.
B. fusiformis, Will.—Very rare.
Bollvina dilatata, Rss.—Very rare.
B. textilaroides, Rss.—Very rare.
B. plicata, d'Orb.—Common.
Cassidulina crassa, d'Orb.—Common.
Lagena globosa (Montag.).—Very rare.
L. depressa, Chaster.—Very rare.
L. lineata (Will.).—Very rare.
L. sulcata (W. & J.).—Very rare.
L. marginata (W. & B.).—Rare.
L. lucida (Will.).—Very rare.
Uvigerina angulosa, Will.—Rare.
Globigerina bulloides, d'Orb.—Common.
Orbulla unversa, d'Orb.—Frequent.
Discorbina obtusa (d'Orb.).—Common.
D. minutissima, Chaster.—Very rare.
D. rosacea (d'Orb.).—Very rare.
Truncatullina lobatula (W. & J.).—Rare.
Pulvinulina Karsteni (Rss.).—Very rare.
Nonionina depressula (W. & J.).—Most abundant.
Polystomella striato-punctata (F. & M.).—Rare.

Five hundred and sixty specimens of *Nonionina depressula* were obtained from this gathering, whilst the remaining 24 species numbered only 201 specimens. *Lagena depressa* was by far the most interesting species; only one specimen was found.

LARCH HILL.

Boulder clay, associated with shell-bearing gravel, Larch Hill, 650 feet above the sea. Weight of clay, 21·3 oz. Troy. After washing, 9·2 oz. fine; ·003 oz. coarse; a few very minute stones more or less rounded. Foraminifera most abundant.

- Millolina seminulum** (Linné).—Very rare.
Verneullina pygmæa (Egger).—Rare.
V. spinulosa, Rss.—Very rare.
Textularia globulosa, Ehr.—Rare.
Bullmna pupoides, d'Orb.—Rare.
B. elegantissima, d'Orb.—Very rare.
B. fusiformis, Will.—Frequent.
Bollvina punctata, d'Orb.—Frequent.
B. dilatata, Rss.—Rare.
B. textilaroides, Rss.—Very rare.
B. plicata, d'Orb.—Very common.
Cassidulina crassa, d'Orb.—Very common.
Lagena globosa (Montag.).—Very rare.
L. apiculata, Rss. ?.—Very rare.

- Lagena lævis** (Montag.).—Very rare.
L. semistriata, Will.—Very rare.
L. lineata (Will.).—Very rare.
L. lævigata (Rss.).—Rare.
L. marginata (W. & B.).—Frequent.
L. Orblignyana (Seg.).—Very rare.
L. fimbriata, Br.—Very rare.
Nodosaria calomorpha, Rss.—Very rare.
Uvigerina angulosa, Will.—Frequent.
Globigerina bulloides, d'Orb.—Most abundant.
G. cretacea, d'Orb.—Rare.
Orbulina universa, d'Orb.—Common.
Patellina corrugata, Will.—Very rare.
Discorbina globularis (d'Orb.).—Very rare.
D. obtusa (d'Orb.).—Common.
D. rosacea (d'Orb.).—Frequent.
D. minutissima, Chaster.—Very rare.
D. tuberculata, B. & W.—Very rare.
Truncatulina lobatula (W. & J.).—Rare.
Pulvinulina auricula (F. & M.), var.—Very rare.
P. Karsteni (Rss.).—Rare.
Rotalia Beccarii (Linné).—Very rare.
Nonionina depressula (W. & J.).—Most abundant.
N. pauperata, B. & W.—Very rare.
Polystomella striato-punctata (F. & M.).—Very rare

Seven hundred and seventy specimens of *Nonionina depressula* were obtained from this gathering, whilst the remaining 38 species comprised only 600 specimens. *Lagena fimbriata* was the most interesting form; it has only been met with as a recent British species off the west coasts of Ireland and Scotland; it occurred in 30 of the Lord Bandon gatherings from between tides to a depth of 214 fathoms.

To Mr. John Smith, of Monkredding, I am much indebted for four samples of shelly Boulder clay from high levels in Ayrshire and Dumfriesshire. A few years previously I had examined, for Mr. T. Mellard Reade, F.G.S.,¹ five samples of Boulder Clay from Ayrshire, which he had collected in company with Mr. Smith, who was the discoverer of these fossiliferous clays in this part of Scotland.² In four of the samples Foraminifera were found in more or less abundance—viz., at Byne Hill Burn, 120 feet O.D., 1,160 specimens were obtained; at Merkland Burn, 550 feet O.D., 22 specimens; at

¹ Geological observations in Ayrshire. *Proc. Liverpool Geol. Soc.* 1896-97, pp. 104-129.

² Drift or Glacial Deposits of Ayrshire. *Trans. Geol. Soc. Glasgow*, Supplement, vol. xl., 1898.

Westown Burn, 500 feet O.D., 1,443 specimens; and at Greenockmains, 600 feet O.D., 12 specimens. The following is a list of the Foraminifera from the clays recently sent to me by Mr. Smith:—

KILWINNING.

"Sandy mud, in Boulder clay, the latter about 20 feet thick, Seven-acres Quarry, under Kilwinning, about 200 feet above the sea." Weight of clay, 21·5 oz. Troy. After washing, 7 oz. fine; 3·4 oz. coarse; stones somewhat rounded, shell fragments frequent. Foraminifera plentiful.

Bolivina pilcata, d'Orb.—Rare.

Cassidulina crassa, d'Orb.—Frequent.

Lagena ? sp.—One specimen.

Polymorphina lanceolata, Rss.—One large specimen.

Globigerina bulloides, d'Orb.—Very rare.

Discorbulina obtusa (d'Orb.).—Rare.

Truncatulina lobatula (W. & J.).—Very rare.

Nonionina depressula (W. & J.).—Very common.

THORNHILL.

"Boulder clay, Tansley Burn, three miles N.E. of Thornhill Station, Dumfriesshire, 1,000 feet above the sea. Stones and boulders, many of them striated." Weight of clay, 25·5 oz. Troy. After washing, 6·2 oz. fine; 4·2 oz. coarse. Foraminifera rare.

Bullimina pupoides, d'Orb.—Very rare.

Bolivina pilcata, d'Orb.—Very rare.

Cassidulina crassa, d'Orb.—Very rare.

Globigerina bulloides, d'Orb.—Rare.

Discorbulina obtusa (d'Orb.).—Very rare.

Truncatulina lobatula (W. & J.).—Very rare.

Nonionina depressula (W. & J.).—Very rare.

MUIRKIRK.

"Boulder Clay, Dippel Burn, near Muirkirk, Ayrshire, 1,061 feet above the sea." Weight of clay, 110 oz. Troy. After washing, 35·4 oz. fine; 19·6 oz. coarse. Foraminifera frequent.

Biloculina ringens (Lamk.).—Rare.

Milliolina seminulum (Linné).—Rare.

M. subrotunda (Montag.).—Rare.

Bullimina fusiformis, Will.—Very rare.

Bolivina punctata, d'Orb.—Very rare.

B. dilatata, Rss.—Very rare.

Cassidulina lævigata, d'Orb.—Very rare.

C. crassa, d'Orb.—Very rare.

Lagena lævigata, Rss.—Very rare.

L. lucida (Will.).—Very rare.

L. marginata (W. & B.).—Very rare.

Globigerina bulloides, d'Orb.—Very rare.

Orbulla universa, d'Orb.—Very rare.

Discorbina obtusa (d'Orb.).—Rare.

Rotalla orbicularis, d'Orb.—Very rare.

Nonionina depressula (W. & J.).—Common.

Polystomella striato-punctata (F. & M.).—Rare.

P. subnodosa (Munster).—Very rare.

I received two packets of this clay. The first weighed 71 oz; I found in it only one solitary example of *Nonionina depressula*; the other, which Mr. Smith informs me was collected about 100 yards distant from the previous one, and weighed only 39 oz., yielded 79 specimens. Much the rarest form in this gathering was *Polystomella subnodosa*; as a recent British species it has only been found off the west coasts of Ireland and Scotland.

"Boulder clay, Leaze Burn, four miles N.E. of Muirkirk, Ayrshire, 1,330 feet above the level of the sea, stones and boulders well striated." Weight of clay, 78·1 oz Troy. After washing, 23·6 oz. fine; 20·2 oz. coarse. Foraminifera rare.

Discorbina obtusa (d'Orb.).—Very rare.

Nonionina depressula (W. & J.).—Rare.

I received two packets of this clay. In one of them I obtained seven specimens; in the other, only one specimen.

The occurrence of Foraminifera at such high elevations in the County of Dublin and in Ayrshire is very instructive, as it shows that the land at these places as well as in Wales was submerged to a great depth during the glacial period. Foraminifera have been found in the drift of Moel Tryfaen in Wales at an elevation of 1,350 feet, at Leaze Burn, Ayrshire, at 1,330 feet, and at Ballyedmonduff, Co. Dublin, at 1,000 feet, and shell fragments were obtained in the gravels at Castle Caldwell, 200 feet higher, but the gravel from this locality has not yet been examined for Microzoa.

In the "Memoir of the Country around Dublin, Explanation of Sheet 112," recently published by the Geological Survey, the writer of the part dealing with the origin of the glacial deposits has attempted to explain that the drifts as a whole, including those that contain shell fragments, have been deposited by land ice and not during marine submergence—that the shell-bearing clays and gravels have been shoved up by ice from the bed of the Irish Sea to their present elevation—that this took place at a time when the basin of the Irish Sea and the adjoining land was buried to a great depth under ice—that the fossil shells are always incomplete and generally mere fragments, and that they are absent from the beds of fine sand

and stratified clay which are imbedded with the Boulder clay and gravels, with other observations supporting this conclusion of a similar purport.

The microscopical examination which I have made not only of the fossiliferous clays at Rockbrook and Larch Hill, but also of Boulder clay from other localities, has led me to a very different conclusion as to the origin of these clays. No doubt there was in glacial times both elevation and subsidence. First glacial striation, then depression, Boulder clay, and marine organisms.

When the writer refers to "the absence of shells from beds of fine sand and stratified clay, which are imbedded with Boulder clay" he might have added, "but in which other marine organisms occur." It is the fine clay which usually yields Foraminifera in the greatest numbers. It was in such interstratified clay, both at Larch Hill and also at Shellag, Isle of Man, that Foraminifera occurred in such profusion. This is also the case in recent marine sedimentary deposits, a soft oozy sea bottom is more favourable to marine life, especially to Foraminifera, than places that are more sandy and where the run of the tides is stronger.

Many of the shells in Boulder clay were transported by icebergs with stones and rock fragments, but some of them certainly lived at the places where they are now found, and with some few exceptions all the Foraminifera must have done so, as they are usually as perfect and as fresh looking as recent specimens brought up by the dredge.

Nor can I agree with the writer that the Irish Sea and the adjoining land was buried under such immense masses of ice. Where did the vapour come from to form these masses of ice, seeing that there could be little evaporation from such a frozen surface? Even presuming such a glacier did exist coming from the North Channel, its natural course would be southward by St. George's Channel where there would be least resistance, and not upwards over the land.

I have examined microscopically 134 samples of Boulder clay from various places in Ireland, England, Scotland, Canada, and Novaia Zemlia, and in 102 of these Foraminifera have been found. Specimens were got in all the samples, 16 in number, which I received from Novaia Zemlia. These had all

to be examined in detail under the microscope, the samples being too small to be treated in any other way. Floatings from the other clays were alone examined; in 32 of these no organisms were found, this may in part be due to the first floatings alone being examined, also that these minute organisms are at times liable to be overlooked when examining the clay. To ascertain how far floatings could be relied on for giving conclusive results, one ounce troy of the Boulder clay from Woodburn, Carrickfergus, was examined with great care. The first floating contained 1,400 specimens, the floating process being repeated 25 times before specimens ceased to come up. What remained of the clay was then examined under the microscope, and 67 additional specimens got from it. Upwards of 2,100 specimens were obtained from this ounce of clay. This experiment clearly demonstrated that the process of floating cannot be relied on for proving the non-existence of Foraminifera in Boulder clay.

The fauna of the Boulder clay is a peculiar one; more than half of the entire specimens found are referable to *Nonionina depressula* and *Cassidulina crassa*; the latter, which is somewhat rare as a recent British species, is often plentiful in the clay. The porcellanous forms are usually very rare, whilst the Arenacea are represented only by the species *Haplophragmium canariense*. It is instructive to compare the number of these two sub-orders from dredgings taken in the Irish Sea, with those that have been found at Larch Hill and Rockbrook. Four small specimens of *Miliolina seminulum* were the only Porcellana found in the Dublin clays, and there were no Arenacea; whereas, in the dredging taken off Dublin by Mr. F. P. Balkwill and myself,¹ 22 species of the former were obtained and 19 of the latter, these being represented by thousands of specimens.

The marine fauna, in a climate so rigorous as must have prevailed during the glacial period, could not fail to be a poor one. Mr. S. A. Stewart, in his "Mollusca of the Boulder Clay of the North-East of Ireland" says, "Molluscan shells occurring in the Boulder clay are not numerous; in most cases they are only got by patient searching, and then only in a fragmentary condition, but in a few instances they are less

¹ *Trans. Roy. I. Acad.*, vol. xxviii. (Science), pp 317—365, 1885.

rare, and include specimens in a perfect state. The presence of perfect shells of *Leda* was known long since to General Portlock, and forced him to the same conclusion as arrived at by the author, that the Boulder Clay is a marine sedimentary deposit."¹ At Woodburn and Knock Glen, Co. Down, *Leda minuta* and *L. pygmæa* are usually found uninjured, and often with valves united. Here, also, Foraminifera occur in the very greatest profusion, 100 species having been found at Woodburn, and 79 at Knock Glen. The Foraminifera in Boulder clay are usually much smaller in size than recent British species, but many of the specimens at these two localities attain fairly large proportions. This, no doubt, is due to these clays having been deposited in deep and quiet water, below the disturbing influence of ice action; it would also account for the abundance of specimens, as well as for the smaller proportion of stones in the clay.

The occasional occurrence in Boulder clay of Foraminifera, which are now only known as recent British species from collections off the west coast of Ireland, and, in one or two instances, off the west coast of Scotland, is of great interest. Three of these species have been found in the clay at Woodburn, and five of them at Knock Glen. Some also have been got at other localities, giving further proof that the Boulder clay was in places deposited in deep water, where the marine conditions must have been somewhat similar to what now prevail off the west coast of Ireland.

Should, at any future time, the sea-bed between Labrador and Greenland be raised above the sea, one can readily imagine such a place to present very similar appearances to those which we now find in Boulder clay. There would be rock fragments and stones striated and scored by ice action, associated with shells more or less broken with other material that had been carried there by icebergs floating southward from Arctic places, the rapidly melting bergs depositing their burden over the sea bottom, and with these would be associated mud and stones from the wearing of rocks in the vicinity, as well as the marine organisms that lived at the place.

Belfast.

¹ *Proc. Belfast Nat. Field Club.*—App. 1879-80.

A WEEK IN CO. KILKENNY.

BY HENRY J. TURNER, F.E.S.

THE following notes on collecting around Inistioge, Co. Kilkenny, are the results of a brief visit paid by Mr. E. Step, F.L.S, and myself on the invitation of Mr. E. Tighe, J.P., D.L., of Woodstock.

During the whole term of our stay, which extended from the 8th to the 16th of August, 1902, the weather was extremely dull and moist. Thus we were at a great disadvantage for collecting, especially as regards Lepidoptera, which we found exceptionally scarce, and, needless to say, in far from presentable condition. Sweeping gave somewhat better results, as in suitable spots plenty of Coleoptera and Hemiptera were obtainable, but the latter were mainly in an undeveloped stage.

The village at which we stayed was Inistioge; a place of some 50 houses situated around a square, at about five miles from Thomastown, the nearest railway station, and about 25 to 30 miles inland from Waterford. This village is on the banks of the beautiful River Nore, and is most picturesquely situated among high wooded hills with jutting rocks, and here and there glimpses of mountain crests in the distance.

Some 500 feet above the river the mansion, "Woodstock," the residence of our host, Mr. Tighe, is situated, about a mile from the village, in a beautifully wooded park, with vistas cut in different directions affording grand and extensive views of mountain, river and valley. The demesne is surrounded by a wall about 10 feet high extending for miles, quite unscalable, as we found occasionally to our cost. Near the house are various avenues of ornamental trees, including an "Araucaria walk" and a grove of the strikingly beautiful *Picea nobilis*, each avenue being about a quarter of a mile long. In addition were specimen trees of numerous Conifers planted in suitable spots, including an isolated *Araucaria imbricata*, which is said to be the largest of the kind in Europe. The interesting fact about all the trees is that for more than a hundred years records have been kept of the planting, growth, size, &c., and successive possessors of the estate have been enthusiastic as to the preservation and extension of this branch of forestry.

The general woodland had been for many years neglected, and the impenetrable tangle was only now being gradually cleared. One of the boasted peculiarities of the estate was the absence of Rabbits and Pheasants.

The capture of such as these were, we were told, considered no crime. Surely there are other places where such a view might be advantageous, if only from the standpoint of the entomologist. Even the deer were few in numbers, and restricted to a small part of the park.

Our collecting and observations were confined to the part I have described above and the nearer fields and lanes, except on one day, when we took an extended trip to climb Mount Brandon, about five miles distant and nearly 1,700 feet above the sea level.

For Rhopalocera sunlight is imperative, so it was only by dint of close application that we could stir out the meagre few mentioned below. The Satyridæ were represented by three species:—*Enodia hyperanthus*, which was common on the pine-clad northern slope of Mount Brandon, *Epinephele jurtina* (*janthina*) common in the water-meadow between Inistioge and Laurel Hill, and seemingly very bright on the underside, and a solitary specimen of *Pararge egeria*. The Nymphalidæ were represented by four species:—*Pyrameis atalanta*, *Aglaïs urticae*, *Vanessa io*, and *Dryas paphia*. The three first-named were in the larval stage, and occurred together in one bed of nettles. I fancy this is rather unusual. The larvæ of *Aglaïs urticae* was exceptionally common, and thousands could have been taken. In fact, they must have become mutually destructive from lack of food later on. *Dryas paphia* was common on the one sunny day we had, flying to flowers of Spur-Valerian in the Park. The Pieridæ noted consisted of one female specimen of *Pieris rapæ* and plenty of *P. napi*, which was disturbed readily in the water meadow. The females of the latter are dark and the undersides are rich yellow, but neither feature seems so pronounced as in examples I have seen from northern Ireland.

Passing now to that division of the Heterocera, which are termed Obtectæ, it will be seen that my list is meagre indeed. Ragwort was excessively abundant everywhere, not a field was without a "forest" of it, but I do not remember having

seen a single larva of *Euchelia jacobææ*. Amongst the Noctuides, five species were noted. One small specimen of *Hydræcia nictitans* was disturbed, as was also a solitary *Apamea didyma*. While strolling along the railway bank at Thomastown just after our arrival we noticed several worn examples of *Cerigo matura*. A pupa of *Gonoptera libatrix* found lying exposed on a sycamore leaf a few inches above the ground produced a fine rich coloured imago, and a worn specimen of *Plusia iota* from the rough growth in a disused limestone quarry at Kilmacshane completes the Noctuidæ. Turning now to the Geometrides, four species only represent the group. *Larentia didymata* was very common among the most luxuriant growth of Bilberry which covered all the exposed open northern slope of Mount Brandon above the belt of pine trees, but all were dwarfed. A worn example of *Thera variata* was taken in the park at Woodstock, and *Cidaria populata*, very small, was equally common among the Bilberry with *L. didymata*. *Eubolia limitata* represents the Fidoniidæ, and was noticed along the railway bank at Thomastown. The Pyralides are, *Crambus tristellus*, and *C. selasellus*, *Aphomia sociella*, *Gelechia domestica*, all solitary specimens. I have bred *Botys fuscalis* from seeds of *Rhinanthus* gathered at Kilmacshane. Of the Incompletæ division, three families only occurred. Cossidæ: the larvæ of *Cossus ligniperda* were in quantities in one poplar tree on the banks of the Nore, each small piece of bark or wood ripped off contained at least two or three, and long ere this I have no doubt that the tree, the "last of its row" apparently, has been devoured to the uttermost scrap. Tortricidæ: *Peronea aspersana*, *Grapholitha nævana*, *Eupæcilia angustana* and *Catoptria scopoliana*, all from heather on the lower part of Mount Brandon. The Tineidæ proper have only one species, *Ochsenhimeria birdella*, also from the heather on Brandon. The Anthroceridæ were represented by *Anthrocera filipendulæ*, which occurred in some numbers on the railway bank near Thomastown.

Passing to the Odonata, we have only three species to record, viz.:—*Calopteryx splendens*, on the bank of the Nore; *Pyrrosoma tenellum*, in numbers over a small piece of ornamental water near Woodstock, partly shadowed by an exceedingly fine and dense clump of bamboo, and a species of *Sympetrum*, possibly *S. striolatum*.

The Coleoptera, mainly obtained by sweeping, were more numerous. The following are the most notable species. The five species of Carabidæ were all taken at the top of Mount Brandon, under large stones. They were *Calathus piceus*, *C. melanocephalus*, *Pterostichus madidus*, *P. vitreus* (a mountain species), and *Trechus obtusus*. The best species taken was in the Nitidulidæ, viz., *Soronia punctatissima*, which was found in quantity in the burrows of the *Cossus*-infected tree referred to above, and in company with *S. grisea*. The species not being recognised at the time, only a few were taken. I believe this is the first authenticated record of the species in Ireland. Its identification was kindly made by Mr. Waterhouse, of the British Museum. *Meligethes rufipes*, and *Byturus sambuci*. Four species of Coccinellidæ were taken : *Coccinella hieroglyphica*, swept from heath on Mount Brandon in numbers ; *Halysia conglobata*, *Micraspis xii-punctata* (an addition to the Irish fauna), and *C. x-punctata*. The Rhyncophora were the most numerous in species. Seventeen species were taken, of which the best were *Dorytomus tortrix*, *Sitones meliloti*, *Caliodes cardui*, *C. contractus*, *A. trifolii*, and *A. carduorum*. Only one species of Longicorn was taken, viz., *Strangalia armata*, although in such a wood there should be a much more creditable list if sufficient work be given to it. The Chrysomelidæ taken include *Lochmæa caprææ*, *Sphæroderma cardui*, and *Chrysomela Banksii*.

To the group Hemiptera considerable attention was given, but owing to the fragile nature of many of the species and the omission to set at once, the identification was in numerous instances impossible. Taking the group Heteroptera first, the family Pentatomidæ are represented by *Eurygaster maura* taken in some numbers in the limestone quarry before mentioned, a single immature example of *Asopus punctatus*, *Tropicoris rufipes* swept freely in the river-meadows, *Pentatoma baccarum* swept in numbers from heath on Mount Brandon, but only three examples were mature; and *Picromerus bidens* all but one immature, in the same place. The Lygæidæ were represented by *Stygnus rusticus* and the Nabidæ by *Nabis limbatus*, and *N. major*. The Capsidæ were stronger in species, at least 15 species were observed, viz :—*Pithanus Maerkeli*, *Phytocoris varipes*, *Calocoris sexguttatus*, *C. chenopodii*, *C. bipunctatus*, *Liocoris tripustulatus*, *Lygus pratense*, *Orthotylus marginatus*, *Plagiognathus arbustorum*,

P. viridulus, *Labops saltator*, *Oncognathus binotatus*, *Rhopalotomus ater*, *Heterotoma merioptera*, and *Globiceps flavomaculata*. In Homoptera the following species were taken, *Aphrophora alni*, *Philaenus spumarius*, type, and vars. *lateralis*, *fasciata*, *leucophthalma*, and *lineata*, and *P. lineatus*, *Ulopa reticulata*, *Pediopsis tibialis*, *P. cereus*, *Acocephalus nervosus*, *Athysanus obscurellus*, *Tettigonia viridis*, *Eracanthus acuminatus*, and the beautiful and active *E. interruptus*, which looks poor in the box compared to its brilliant green and black when alive.

Mr. West, of Greenwich, very kindly identified a number of species, both of Coleoptera and Hemiptera, for me, and I am also indebted to Mr. Kemp for much assistance.

Turning now to the Diptera, to which no special attention was paid, I have to record *Tabanus bovinus*, *Sarcophaga carnaria*, *Mesembrina meridiana*, *Tachina grossa* (a good species, taken at the top of Mount Brandon, sitting on one of the stones composing the cairn), *Tipula gigantea* (in the river meadow), *Volucella bombylans* (in the woods), *Arctopluta mussitans* (on Mount Brandon), *Sicus ferrugineus* (in the woods of Woodstock), and *Gastrophilus equi* (in numbers, flying around the cairn at the top of Mount Brandon, and in flight, hum, and general appearance, simulating a swarm of bees). For some of these identifications I am indebted to the kindness of Mr. Wainright, of Birmingham, who remarks on the curious habit *G. equi* has of swarming at the tops of high elevations.

No attention was paid to the Trichoptera and only two very common species were brought home, *Chimacha marginata* and *Leptocerus albifrons*.

Mr. Clark has very kindly identified a tick which I came across in sweeping as *Ixodes reduvius*.

As regards the birds seen I have very little to record. Jackdaws were very common in flocks; one, especially large, frequented the village. A flock of Black-headed Gulls were on the mud banks of the Nore. The Pheasant and Partridge were conspicuous by their complete absence, but Grouse are preserved in small numbers on an outlying and restricted portion of the estate. A belated nest of the Common Bunting, with two eggs, was photographed on August 13th.

Hatcham, London S.E.

SOME RECENT RECORDS FOR THE FLORA OF COUNTY DUBLIN.

BY NATHANIEL COLGAN, M.R.I.A.

THE following notes embody a selection from the more interesting results of a continued survey of the County Dublin flora, the records belonging for the most part to the years 1901 and 1902. The botanical exploration of the county is now so far advanced that the addition to the flora of a well-defined native species is hardly to be looked for. There is still room, however, for additions in the shape of aliens or of critical sub-species or well-marked varieties, and a few such additions will be found in the records here given, where they appear with the names printed in SMALL CAPITALS to distinguish them from the general body of the notes. In the case of aliens this distinction is used only where the plant is considered so well established as to deserve a place in the permanent flora. Where no authority for a record is given the plant was observed by the writer.

Thalictrum dunense, Dum.—At the northern end of Portrane peninsula, 1900-02.

Ranunculus Lingua, L.—In a marsh drain near Balrothery, south of Balbriggan, 1902. Now a very rare plant in the county, save in the Royal Canal.

FUMARIA PURPUREA, H. W. Pugsley. (*Journ. Bot.*, 1902, pp. 179-80.)—Specimens gathered in sandy fallows near Rush in 1902 have been marked "typical" by Mr. Pugsley, who has kindly examined for me a series of County Dublin Fumitories. Close to *F. speciosa*, Jord., and long mistaken by British botanists for *F. Boræi* of the same author, as Mr. Pugsley has well shown in his valuable paper on the British Capreolate Fumitories (*Journ. Bot.*, *loc cit.*). True *F. Boræi* was found in abundance in a corn-field at Ballybrack in 1902.

Cardamine pratensis, L.—The remarkable proliferous state of this species, in which young plants are developed on the upper surface of the leaflets, was gathered in the central marsh at Howth during the mild wet winter of 1902. According to Mackay (*Flor. Hib.*, p. 20) this state produces double flowers.

***Alyssum calycinum**, L.—One strong plant, 7 inches high, in a sandy field near Kilcrea, Malahide Creek, 1902: Dr. Scully & N. C. This alien has appeared at intervals and sparingly in sandy ground along the coast from Portmarnock to Rogerstown for the last 65 years, but, so far, does not appear to have succeeded in establishing itself.

- ***Sisymbrium pannonicum**, Jacq. (*S. altissimum*, L.)—First noticed as a ballast plant near the East Wall, Dublin Harbour, in 1894, this East European alien appeared frequently, and in some places in luxuriant growth, along the new tram line between Dollymount and Raheny in 1900, some of the plants growing to a height of 4 feet. In the following year a few seedlings appeared on the same tram line near the end of Long-lane, Sutton.
- ***Cardamine Impatiens**, L.—About a dozen plants on the top of a shaded wall near Dalkey, 1901-03; probably an accidental introduction. The habitat is an unusual one.
- ***LEPIDIUM DRABA**, L.—In profusion, spreading for about 100 yards in waste ground, and on the banks of a railway siding near the mills at Cross Guns, Royal Canal, May, 1903; F. C. Crawford & N.C. An alien thoroughly established in this station, where it appears to reproduce itself by seed. Previously noted in the county, as a casual only, by Mr. Praeger, near Liffey Junction in 1894.
- Geranium columbinum**, L.—In fair quantity on the limestone rock of Carrick Hill, near Portmarnock, 1900; a new station for this rare species.
- ***Lotus tenuis**, Waldst. and Kit.—One large patch in a fallow field near Donabate, 1901.
- ***Sedum album**, L.—Abundant on the seaward slope of the railway bank near the tunnel at Vico, spreading from the summit to near sea-level, 1901-03; sparingly on limestone rock at Kirkpatrick bridge above Blanchardstown, 1902-03. Often planted on walls, and apparently becoming naturalised in the county.
- CALLITRICHE OBTUSANGULA**, Le Gall.—Ditches at Garristown Bog, 1894, and at Lusk Ponds, 1902; verified by Messrs. H. and J. Groves.
- ***Bryonia dioica**, Jacq.—Thoroughly established on the cliff or high drift bank below Earlscliff, south side of Howth Head, 1902. There are at least a dozen luxuriant plants here, of both sexes, scattered amongst brambles and bushes over a space of 100 yards from east to west. Fruit was abundant here in 1902, and the plant appears to have spread rapidly since it was first observed in this station in 1894 by Miss A. G. Kinahan. The fruit is without any obvious special contrivance for distribution; nor can I discover that it is eaten by birds. If the plant should have been wilfully introduced and spread, it is to be hoped that the offender will make the only amends now possible by publishing a full confession in this Journal.
- Aplum nodiflorum**, Reichb., var **repens**, Hook. fil.—Abundant in pools in the Bog of the Ring, 1902.
- ***Carum Petroselinum**, Benth. and Hook. fil.—In considerable quantity on a bank by the sea, near the Martello Tower at Skerries, 1902.
- +**Chærophyllum temulum**, L.—Abundant, and in places luxuriant on hedge banks by the Malahide Creek, from near Lissen Hall to Prospect Point, stretching for about half a mile, 1902: Dr. Scully and N.C.—Bank by the roadside between Lucan and the Royal Canal, 1895-1903.

- ***Pencedanum sativum**, Benth. and Hook. fil.—Abundant, and evidently long-established, on quarry spoil-banks near 3rd lock, Grand Canal, 1902.
- ***SAMBUCUS EBULUS** L.—Fully established at intervals for 130 paces along railway banks east of Liffey Junction, 1903; F. C. Crawford & N.C. The standing of the plant here entitles it to a place in the county flora.
- †**Valerianella Auricula**, D. C.—In sandy fallows, Portrane, 1900; and a few plants on the railway north of Donabate, 1902.
- Anthemis arvensis**, L.—Abundant in a new pasture, and in adjacent fallows between Lusk and Man of War, spreading over fully half an acre, 1902; several plants in a wheat field, Portrane Peninsula, 1902; a welcome confirmation of earlier records, since the species of this genus are not infrequently confounded with each other—and, indeed, with species of the neighbouring genus *Matricaria*.
- Artemisia maritima**, L.—A large patch spreading for 15 yards along a mud bank above a salt-water ditch near Baleally, Rogerstown Creek, also a few plants along the banks of the ditch, 1902. The only Co. Dublin station where this rare plant occupies such a habitat.
- ***A. Stelleriana**, Besser.—In August, 1901, two plants of this naturalized alien were found on the shore near the end of Long Lane, Sutton. These were probably derived from the North Bull, to the extreme northern end of which, separated only by a narrow water channel from the Sutton shore, the plant has now spread. Its total extension on the North Bull in 1902 was found to be fully a mile and three quarters.
- Matricaria inodora**, L.—A curious monstrous form of this common sea-coast plant was observed on the shore at Portrane in November, 1902, by Dr. Scully & N. C. In this form the main flower-head produced from its involucre bracts a perfect umbel of long-stalked pseudo flower-heads, made up only of aggregations of involucre bracts. Many of these pseudo flower-heads in turn produced similar umbels, the whole arrangement resembling in form the compound proliferous umbels of *Allium Babingtonii*. Dr. Maxwell Masters, to whom a specimen has been submitted, is inclined to attribute the monstrosity to irritation due to insect puncture.
- Senecio vulgaris**, L., var. **radlatus**, Koch.—Abundant and very well marked in association with the type and with *S. squalidus* in waste ground near Inchicore railway works, 1902: F. W. Burbidge & N. C. —probably introduced from Cork with *S. squalidus*.
- ***S. squalidus**, L.—A few large plants on the wall of the Phoenix Park, near Island Bridge, 1902-03, nearly half a mile distant from the Inchicore railway works, where it is fully established. These Phoenix Park plants probably originated from seeds wind-borne from Inchicore.
- ***Centaurea aspera**, L.—One clump of several plants in a sandy pasture field at Portmarnock, 1902.

***Lactuca muralis**, Fresen.—Several plants on an old garden wall by the shore below Raheny, 1892-1902, apparently a casual introduction and increasing.

HIERACIUM MACULOSUM, Dahlst. ?—A Hawkweed of the *H. murorum* section, obviously new to the County Dublin and in many points resembling Dahlstedt's plant, turned up quite unexpectedly on a railway embankment and adjoining spoil mounds near Liffey Junction on the 27th May last, while the writer of these notes and his friend, Mr. F. C. Crawford, of Edinburgh, were botanising along the Royal Canal. Several hundreds of plants were observed in various stages of development, from seedlings up to fully flowering examples, the leaves in all cases been conspicuously marked with dark brown blotches. Specimens have been submitted to Rev. E. S. Marshall and Rev. W. R. Linton. So far neither authority is satisfied to adopt my conjectural naming of the plant as Dahlstedt's *H. maculosum*, though Mr. Linton thinks it may perhaps be placed under it as a form.

Wahlenbergia hederacea, Reichb.—Grassy places near the summit of Feather Bed road at a height of 1,600 feet, 1902. An interesting new station, where the plant attains at once its northern limit and its highest vertical range in Ireland. Said to have been found at Killiney, a not unlikely place, where, however, I have not so far succeeded in discovering it. Further information as to its occurrence in this station would be most welcome.

***Campanula rapunculoides**, L.—Abundant over a considerable area in a sandy potato field and on adjoining banks west of Rogerstown coastguard station, 1900-03; pasture above the sea at Vico, Killiney Bay, in considerable quantity, spreading over a space of 30 paces by 15 paces, 1899-1902; well established on the permanent way at Kingstown terminus, 1899-1903. This plant seems fully entitled to a place in the Dublin flora.

Vaccinium Vitis-Idæa, L.—Sparingly on the northern slope of Seecawn Mountain near the summit, 1900—the second Co. Dublin station, the plant being previously known only on Kippure.

V. Oxycoccus, Roth.—In a boggy hollow on Glendhu Mountain at 1,900 feet, 1901—the highest station so far recorded for this species in Ireland, and the only definite station on record for Co. Dublin. In the *British Assoc. Guide*, 1878, the plant is entered for Dublin and Wicklow as "Rare on the mountains," but without any precise locality.

Andromeda Polifolia, L.—Frequent in a wet level bog on Prince William's Seat above Glencullen quarries, 1901.

Erica cinerea, L., *forma*.—A curious form of this was gathered at Howth in August, 1902, growing in association with the type and apparently standing to it in much the same relation as the var. *Stuarti* Macf., stands to *Erica Mackaii*. In this Howth form the styles and anthers are extruded from the corolla in varying degrees, and on examination of the flowers in which this character is most

conspicuous the corollas are found to be shortened by a well-marked fold or wrinkle near the base. Whether this be a cause or an effect of the forcible extrusion of the anthers through the narrow mouth of the corolla, it is not easy to decide. It may be of interest to note here that a precisely similar folding or wrinkling of the corolla, accompanied by a similar extrusion of the anthers, appears in some of my herbarium specimens of *E. Stuarti*. It was probably the study of such an extreme form that induced the Rev. E. F. Linton to suggest a hybrid origin for this plant, as he has done in the issue of this Journal for August last, where, however, he makes no reference to the folding of the corolla, while laying due stress on the exertion of the anthers. This folding does not appear to be characteristic of *E. Stuarti*. It is not mentioned in Dr. Macfarlane's original description of the plant (*Trans. Edinb. Bot. Soc.*, xix., 58, *et seq.*), and seems to be rather a morbid state than the result of hybridization. The Howth plant just described would appear to be an analogous morbid state of *E. cinerea*, and further analogies in the relations of this plant and of *E. Stuarti* to their respective types are to be found in the dwarfing of the flowers and in their lighter colour towards the base.

***Lysimachia Nummularia**, L.—In a marshy pasture by the Liffey near St. Catherine's, 1901, and abundant in a swampy field below Feltrim Hill, 1902. An outcast or escape from cultivation.

Cuscuta Trifolii, Bab.—Abundant in August, 1902, on grassy banks in the Rush sandhills, especially about the Coastguard Station, spreading at frequent intervals for a quarter of a mile; also some large patches in fallows further inland—occurring on *Anthyllis*, *Ononis*, Clovers and Thyme. Apparently a recent introduction to this part of the county.

***Lycium barbarum**, L.—A single well-grown plant near the northern extremity of the North Bull, amongst *Artemisia Stelleriana* and fully a mile distant from the nearest house or garden, 1901-3. Perhaps drifted from the opposite sandy shore at Sutton, where this southern alien is well established over a length of 100 yards.

***Lycopersicum esculentum**, Miller. (Tomato).—Several well-grown flowering plants on the sandy shore of a creek near Cardy Rocks, north of Balbriggan; several others farther north on the open sandy shore, and three more still farther north near Lowther Lodge, 1900. There are no gardens in the vicinity of these stations. The plants may have originated from drifting fruits thrown out from some passing passenger steamer, or from some garden along the coast. Fruits may often be seen floating in harbours.

Utricularia neglecta, Lehm.—Abundant and luxuriant in Raheny quarries along with *U. vulgaris*, both flowering freely, 1902.

Plantago intermedia, Gilib.—By the margin of a shallow pool in the Portrane sand hills near Corballis, 1902: Dr. Scully and N. C.

Scleranthus annuus, L.—Abundant in a corn field near Damastown, Naul Hills, 1902.

***Narcissus biflorus**, Curtis.—Frequent about the obelisk, Killiney Hill, 1902, where it has persisted for upwards of a century; abundant over nearly an acre of old pasture, near Dardistown, 1903. I shall be glad to receive recent records, accompanied by a specimen, of the occurrence of this species in any wild station in Co. Dublin. At one time it seems to have been frequent in the county.

Carex paniculata, L.—Abundant in a swamp on Glencullen Mountain, 1902. Also found last year in abundance by Mr. Praeger along the stream draining the marsh near Ballybetagh House.

Glyceria Borreri, Bab.—Frequent in clefts of the South Wall, beyond the Pigeon House, 1902.

G. pilcata, Fries.—Frequent throughout the county, occurring in all the districts, and apparently more frequent in the lowlands than *G. fluitans*.

Festuca uniglumis, Solander.—In sandy ground near the Coast-guard station at Rogerstown, 1900.

F. Myuros, L.—A few plants on the permanent way near Donabate railway station, 1902. Mr. Praeger tells me that he has found it this year on old walls at Chapelizod. A rare grass in the county.

Sandycove, Co. Dublin.

NEWS GLEANINGS.

The Belfast Field Club.

The elections at the annual meeting of this Club, held on April 28, had more than ordinary interest. With deep regret we read of the resignation from the Committee of two veteran members, S. A. Stewart and William Gray. Mr. Stewart was one of the founders of the Club forty years ago, and he has held a place on the Committee without a break from that time till the present. Mr. Gray joined the Club a year later, and has also a continuous record to show, embracing all the offices in the Club. Their duty has been well done. On the other hand, we welcome with feelings of the liveliest satisfaction the addition of three Queen's College men to the managing body of the Club. Prof. Symington, lately elected F.R.S., is now Vice-President, and Professor Gregg Wilson, and his demonstrator, G. C. Gough, hold places on the Committee. It is now twenty-three years since any Queen's College Professor held office in the Club—a strange and deplorable thing, when one considers the respective missions of the two institutions, and the almost unlimited capacity for mutual aid which they possess. May the connection now so happily formed be long maintained!

OBITUARY.

JOHN BAIN, A.L.S.

John Bain was of Scottish parentage, but was born in Ireland in 1815. Very early in life Bain acquired a sound and practical knowledge of his father's calling as gardener and land steward, and after some further experience in private gardens, and in the Physic Gardens at Chelsea, he, as an active and studious young man, entered the old College Botanical Gardens in Dublin, then under the Curatorship of J. Townshend Mackay, LL.D., author of the *Flora Hibernica*, and one of the best of the earlier students of the Irish flora. Mackay had founded the College Gardens in 1806, for the University authorities of that date, and being a man of character and influence he attracted around him men who afterwards became celebrated as horticulturists both at home and abroad. Bain became foreman, and eventually Assistant Curator to Dr. Mackay, whom he helped as a friend and amanuensis in the preparation of the *Flora Hibernica* and other works. On the death of Dr. Mackay, in 1862, Bain succeeded to the Curatorship, and the University Gardens under his care took on a second lease of usefulness and popularity. He was all his life a keen and ardent botanist, retaining a critical and accurate knowledge of native plants to the last, and his skill and success as a cultivator was very often the wonder and envy alike of his horticultural contemporaries. Bain was one of the first to adopt a cooler, more airy, and rational treatment in the growth of orchids and other exotics, and his more natural system was recognised by some of the most noted botanists, nurserymen, and amateur cultivators of his time. Visitors to the Gardens in those days, included not only College dons, and eminent physicians and surgeons like Stokes, Crampton, Corrigan, Hudson, Butcher, and others, but Archbishop Whately and other divines enjoyed Bain's society and conversation, and Whately especially was one of his most constant visitors. Although Bain wrote but little himself he was never weary in aiding others by his advice and clear-sighted but genial criticism. The late Mr. William Archer, Librarian of the Royal Dublin Society, the National Library, and a distinguished microscopist, the late Mr. A. G. More, F.L.S., these amongst others, including the late Mr. Thomas Bewley, one of the most princely of amateur gardeners near Dublin in the last century, were amongst his most intimate friends. Bain was in his younger days a zealous and active collector, and he assisted Mackay in the field botany excursions then popular, and even later in life walked miles to show the present writer the habitats of rare native plants including *Gentiana Pneumonanthe*, *Listera cordata*, *Malaxis paludosa*, *Isoetes lacustris*, *Trichomanes radicans*, and *Hordeum sylvaticum*, which he originally discovered in Ireland in the wood at Mount Merrion, near Dublin. He was one of the oldest living associates of the Linnean Society, but his maxim was useful, practical work in horticulture and botany, rather than literary honours, to which he was superior. Although very sensitive and retiring in manner, Bain was genial and generous to those who really knew and respected him, and his memory

will be cherished and kept green by all who really knew him as the good fellow he was. A little collecting tour in either Ireland or in Wales with Bain, even in his older days, was an experience no naturalist would ever be likely to forget, no matter what his own speciality might be; and although his eyesight somewhat failed him after his eightieth year, yet he could detect and correctly diagnose a rare flowering plant, moss, or fern to the last. He was never married. He died peacefully at Holyhead on April 28th, at 2 o'clock p.m., and he was laid to rest near the avenue of quaint old hawthorn trees in the Cemetery at Mount Jerome, near Dublin, on Friday, May 1st, beside his two brothers, Robert and William Bain, James Fraser and Dr. J. T. Mackay, and also near to other of his many old friends who had already crossed the bar.

F. W. BURBIDGE.

REVIEW.

NATURE STUDY.

My Nature Notebook. By E. KAY ROBINSON, author of "To-day with Nature." London: Isbister & Co., Ltd. Pp. 212. 2s. 6d.

This little book is a reprint of the "Nature Notes" which appeared in the *Daily Graphic* during 1902. The writer is a good observer, and one cannot read through many of his pages without finding both information and suggestion, though these are imparted in a somewhat random fashion, and it is doubtful whether the volume quite rises to the level claimed for it in the author's preface, of "a cursory record of one year week by week." Some views advanced on the subject of migration are scarcely in harmony with the results of recent inquiry. Mr. Robinson maintains that "the wind is a constant factor, and a very important factor," in accelerating and assisting the flight of migrants; thus—

"If the wind blows from the north only at the rate of fifty miles an hour, the swift, flying sixty miles an hour, will have achieved a hundred and ten miles; while the Willow-wren, with thirty miles an hour, would have flown eighty; and, of course, the stronger the wind the less would be the proportionate difference."

In fact, the stronger the wind, provided it blows in the right direction, the greater, Mr. Robinson implies, will be the assistance rendered to the migrant, and particularly to the migrant of weaker wing-power. Unfortunately for this theory, it is in calm, anti-cyclonic weather that birds chiefly travel, and the mere direction of the wind, apart from its strength, evidently—according to lighthouse observations—affects them very little. It would, however, be unfair to judge Mr. Robinson's general reliability by an occasional faulty inference of this nature. On many of the subjects on which he touches there is plenty of room for differences of opinion; but this does not detract from the zest with which his pages may be read, and one has the feeling that the sketches are really drawn from nature by a hand neither inexperienced nor unskilful.

C. B. M.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a beautiful young Zebra from Mr. Verner, three white Rabbits from Mr. Seaman, an Arabian Baboon from Mr. J. P. Mullins, twenty-one birds of various species from Mr. F. W. L. Holt, two Hooded Crows from Mr. A. B. E. Hillas, a Gannet from Mr. S. Segrave, and a pair of Doves from Miss Eleanor Story. The generous offer of a female Giraffe from the Sirdar of the Egyptian Army, to accompany the male which he is now sending from Khartoum, has been gratefully accepted by the Council. A Capuchin Monkey and six Flamingoes have been purchased. Five Wolf-cubs, a Barbary wild Sheep and a Raccoon have been born in the garden.

BELFAST NATURALISTS' FIELD CLUB.

MAY 23.—EXCURSION TO ISLANDMAGEE.—Fifty-two members assembled at the Northern Counties terminus at 9.45 to proceed *via* Larne to Port Muck, Islandmagee. Immediately on arrival at Larne Harbour the whole party crossed to Islandmagee, where cars were in waiting, which were used by some of the ladies, and which also carried the provisions, cameras, and collecting-bags. The greater number of the members preferred to walk, and soon the botanists were at work, the temptation to linger being very great. Presently the road, fringed with great masses of Alexanders (*Smyrnium Olusatrum*) in flower was left, and a field path taken through farms and over the gentle hills, until suddenly the destination, Port Muck, with its white shingle of rolled flints, and its white houses glistening in the sun, was in sight. A narrow strait divides the Island of Muck from the mainland, and the receding tide was just showing the ridge of the natural causeway which at low water forms a footway to the island, and which looked much easier to traverse than it actually proved later on. Leaving the neat coastguard station on the left, the party descended to Port Muck, and an old ruin on the edge of the cliff was investigated. The party then proceeded to the beach, and as it was now low water the majority were enabled to walk across the boulder causeway to Muck Island—not, however, without various slips and falls and consequent wet feet. Others took advantage of the kindly offer of the local coastguards, who placed their boat and themselves at our service, and, wading in the shallow water, carried the ladies in a more or less unconventional manner to the boat. When all had reached the island the serious work of the day was begun, and the party separated to thoroughly explore the island. While some collected in the rock-pools and among the seaweed, others ascended to the top of the island (110 feet), and watched the numerous birds on the cliffs and

sea-stacks, while the botanists made the most of their time, as shown by a list of twenty species of marine algæ (including *Conferva brecca*) and many land plants, *Asplenium marinum* and *Ophioglossum vulgatum* being the best finds of the latter. The following birds were found to be nesting on the island:—Herring-gulls, Jackdaws, Rock-pipits, Lapwings, and Martins, while information was obtained of Sheld-drakes having had a nest there this season. The rarest bird observed was the Manx Shearwater, a pair being seen on the eastern side of the island, where they probably breed. Altogether forty-seven species of birds were noted during the day by the ornithologists of the party. The rock-pools yielded several species of amphipods and isopods, fishes of the ordinary shore kinds, crabs and many other marine animals, and good collections were made. On the highest parts of the island those curious pellets cast up by the gulls were found, some consisting wholly of bones and teeth of fish, others contained remains of rat, rabbit, mouse, and innumerable crabs, with a few wire-worms, while the numerous wing cases and legs of beetles in others proved the gulls to be good friends to the farmer. The day was too dry for land-shell collecting, but six common species were found on the island, including the white form of *Helix rotundata*, which seems to be as rare in Ireland as the type is common. The marine shell, *Trochus helycinus*, var. *fasciatus* was found in quantity in the centre of the causeway, and seemed to be spawning there. This variety is rare here, almost the only recorded locality being Portrush in 1898 (Nichols). Altogether twenty-seven species of beetles were collected, one little pond alone yielding five species. The steam-launch of the Ulster Fisheries Association came round from Larne, and did some dredging in the neighbourhood of Port Muck, the members watching the operations with great interest. At half-past three the coastguards took the entire party back to Port Muck, as the causeway had disappeared under the incoming tide. Here some time was spent investigating the outcrop of Greensand, many characteristic fossils being obtained by the geologists of the party. Fine new examples of snail borings under ledges of the Chalk cliffs were found here, with specimens of *Helix nemoralis* sheltering in them. In some cases clusters of the holes were found together, and these were well photographed. The site of the abbey was then visited, and the return journey was begun, some going by cars and the rest walking. Those who crossed in the first ferries paid a visit to the Marine Laboratory of the Ulster Fisheries Association, being shown over the house by a member of the association who was working there. At 6.30 all were enjoying a well-earned and most welcome tea in the Olderfleet Hotel, after which a short business meeting was held—the President, W. J. Fennell, M.R.I.A.I., in the chair—at which nine new members were elected. It was announced that Miss Massy, a member of the Dublin Field Club, had kindly sent a box of small marine shell debris from the Malahide estuary, for distribution among the conchological members of the Belfast Club, and this was much appreciated by them. The 7.25 train was taken at Larne Harbour, and Belfast was reached about 8.30 p.m., when the members separated.

DUBLIN NATURALISTS' FIELD CLUB.

MAY 30.—EXCURSION TO MONTPELIER.—Fifteen members and visitors were present. The start by car and cycle from Terenure was made under most unpromising conditions of weather, rain coming down in torrents at the appointed hour of departure. Matters soon improved, however, and fortunately the rain kept off for the rest of the day.

On the way to Rockbrook, where the party was met by the conductor, Professor Cole, the post-glacial river terraces of the valley, now grass-covered, were conspicuous. The party then walked from Rockbrook to the base of Montpelier Hill. Near Mount Venus an exposure of the central granite of the Leinster chain was noted in the roadway, and a little further on beyond the junction, which is not exposed here, the uptilted Silurian schists, with intruding veins of granite, were seen. Ascending the hill, which is formed of these schists, but which retains a cap of gravel, the change in the character of the vegetation was soon apparent, the rich fields on the Boulder-clay below giving place to the plant associations in which the gorse and heather predominated on the poor soil derived from the schists. The gravel cap, however, seems to bring in the grass type once more, and from a pit just south-east of the summit the great masses of drift banked up against the hills, and the contrast between the vegetation on this and on the almost bare granite of the hills themselves, was very well seen.

Professor Cole here took the opportunity of explaining how this great mass of drift, made up of materials melted out of the great ice sheet, with the addition, notably in the upper layers, of local granite boulders, and reaching at the head of Kelly's Glen, a height of 1,250 feet, had been deposited. The party were then fortunate in being joined by Mr. G. W. Lamplugh, who had at some personal inconvenience left Belfast earlier in the day in order to be present at the excursion. After a brief interval for lunch, a descent was made into the Dry Gap, where Mr. Lamplugh explained its characteristics and its probable mode of origin. During the glacial period the land ice probably closed up the outlet of the pre-glacial valley of Glenasmole, and when the snows and ice melted this valley became a lake, the waters of which were dammed up sufficiently high to find an outlet over the eastern wall of the valley, choosing the lowest notch, the outflowing volume of water speedily caused a rapid denudation, thus producing the present steep-sided ravine, which subsequent slower weathering has converted into a pass with the highest point in the middle.

Leaving the gap, the party walked on to the boggy ground above Piperstown, where the xerophytic characters of several of the predominant plants were discussed. Butterworts and Sundews were found, as well as one example of the rather uncommon orchid *Listera cordata*. The party then returned by road to Rockbrook for tea, passing through a part of Cruagh Wood, a well-known gravel pit at 800 feet, and the great masses of gravel through which the Rockbrook stream cuts being noted *en route*. The prize offered by Dr. Pethybridge for the best account of the excursion, has been awarded to Mr. F. O'B. Ellison.

NOTES,

BOTANY.

County Down Plants.

Late in August last year, while rambling along the shore between Groomsport and the Orlock Coastguard Station, I came across several fine clumps of the Samphire. At the same time and place I observed the Scottish Lovage. Both species were in bloom, and vigorous. Nearer Groomsport the Field Gentian was in quantity, and looked lovely, surrounded by the scant and parched herbage of the rocky headland.

WILLIAM PORTER.

Belfast.

Ranunculus Auricomus.

When driving, on April 25th, near Castle Blunden, two miles west of Kilkenny, I was greatly struck by a *Ranunculus* on the roadside. The flowers were so large and perfect I could scarcely believe it to be *Auricomus*. There was some water by the edge of the fence, and as the car drove quickly by, *Caltha* passed momentarily through my mind. It was, however, *R. Auricomus*, with splendid flowers, some one and a-quarter inches across, on tall vigorous stalks. I never saw perfect blossoms in Ireland in such quantity—if, indeed, I ever saw perfect ones at all—for some of the petals are usually abortive, and those that are not abortive drop off on the slightest touch. Syme says, in *English Botany*—"In Scotch specimens I have very seldom found the flowers perfect—but in Kent and Surrey they are generally so." There was plenty of *Auricomus* with abortive petals within 100 yards of the plants with perfect flowers. The latter were more shaded, and the soil they grew on was wet and pasty. I send a blossom.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

[Mr. Barrington's plant is very striking. I do not know if this is a described variety. The "tall vigorous stalks" preclude its reference to var. *grandiflorus*, Lecoq et Lamotte. I have not seen the leaves.

R. L. P].

ZOOLOGY.

Partial Migration of Sparrows.

During the month of March I observed numbers of dark-coloured House-Sparrows (*Passer domesticus*) in this neighbourhood, quite different in appearance from the lighter coloured and cleaner birds resident here throughout the winter. I believe this to be accounted for by these birds migrating to the larger towns for the winter, where food would be more abundant, and getting begrimed in the sooty atmosphere; but with the return of spring they return to their breeding haunts.

NEVIN H. FOSTER.

Hillsborough, Co. Down.

Migration of the White Wagtail.

The passage of the White Wagtail (*Motacilla alba*) up the west coast of Ireland to its breeding haunts in Iceland and Faroe, is evident from the fact that I received three from the west coast of Donegal, which were obtained during the first week of May this year.

R. M. BARRINGTON.

Fassaroe, Bray.

Swallows in March.

The arrival of the Swallow (*Hirundo rustica*) is seldom observed in Ireland before April, but in 1903 it has appeared over a wide area in March, and in each of the following cases my kind informants assure me that it was the Swallow, not the Sand-Martin, that they saw at the following dates and places:—

March 17,	Daramona,	Co. Westmeath.
„ 22,	Mountjoy Square,	Dublin.
„ „	Dalkey,	Co. Dublin.
„ 23,	Swords,	„
„ „	Newry,	Co. Down.
„ 26,	Lisburn,	Co. Antrim.
„ 28,	Castleconnell,	Co. Limerick.
„ „	Knocklong,	„
„ 30,	Kilcock,	Co. Kildare.
„ 31,	Newbridge,	„

The Sand-Martin was heard at Leighlinbridge, Co. Carlow, on 22nd March.

R. J. USSHER.

Cappagh.

Iceland Gull in Co. Londonderry.

On April 20th Colonel H. S. B. Bruce picked up on the shore of Lough Beg a dead gull, which he sent by post to the Belfast Museum. The following day it came into my hands. It was a fine adult Iceland Gull (*Larus leucopterus*), in beautiful plumage. Unfortunately it was too long dead to be mounted, but Mr. S. M. Stears kindly skinned it for me so that it can be examined by anyone interested. I had never seen an Iceland Gull "in the flesh" before.

ROBERT PATTERSON.

Belfast.

The Great Bustard in Ireland.

Messrs. Williams and Son record in the *Zoologist* for April the occurrence of two Great Bustards in Co. Tipperary in December last year, one being shot. But the recent liberation of a number of Great Bustards in Norfolk seriously affects the value of what would otherwise be a new record for Ireland. To put it mildly, it is a singular coincidence that the *first* appearance of the species in Ireland should so closely follow its deliberate introduction into England.

Protection of the Red-throated Diver in its Irish Nesting Haunt.

In the *Irish Naturalist* for May the Editors reprove me for mentioning in my notes on Donegal Birds to the *Zoologist*, the only locality in Ireland at present known to naturalists where the Red-throated Diver breeds, or rather tries to, every season; the exact spot is not divulged, and I think the English collector or dealer would have some trouble in finding it, should he think it worth his while to send over and try.

But my present object in writing is not to protect these poor birds from the English invader, but from certain persons residing in the vicinity, and I think, in the interests of Irish ornithology, something should be done and at once so as to save the eggs from being taken this year. I know the name of a person who has harried these birds, and who has an open order for a clutch of their eggs from a high Government official, and doubtless, unless some steps are taken to prevent a repetition of this cruelty, this worthy will rob the nest again, and be paid for his trouble to the tune of half a sovereign an egg.

Now I suggest a watcher be put on this season until the young birds are clear of the nest, and the expense of this borne by the Fauna and Flora Committee, or by a few Irish ornithologists, who really have the protection of our rare Irish breeding birds at heart; for, as Mr. Kearton says, "once a bird drops below a certain point of rarity, the premium upon its skin and eggs appears to seal its doom," which is doubtless very true in this case.

W. C. WRIGHT.

Belfast.

In the *Zoologist* for April Robert Warren contributes a strongly-worded protest against the continued persecution of the Red-throated Diver at its only Irish breeding-place, and makes the welcome announcement that the owner of the lakes has taken the matter up, and has issued orders to his keepers for the strictest preservation of the birds and their eggs for this and future seasons. This is the action of a true naturalist, and if other land-owners would follow Mr. Herdman's example, our vanishing rare birds and mammals would have a chance of surviving.

THE EDITORS.

Some Ornithological Notes from Moyview.

The severe spring weather delayed the departure of our winter visitors, as well as the arrival of many of our summer birds.

Some Wigeon were seen about the 25th of April; while a flock of twenty-five to thirty Pintails frequented the sands of the estuary off one of my fields daily, until same date, when they were last seen.

Having visited Bartragh on the 30th, I met in the channel several lots of Red-throated Divers—fifteen altogether—many of which appeared to be in summer plumage; but they were very wild, and gave me no chance of obtaining a specimen. These birds usually assemble every season in the estuary before leaving for their northern haunts.

On the 28th of April I found a fine specimen of the Fulmar washed up on the shore here; it was quite fresh, but quite spoiled by the Great Black-backed Gulls, so was useless for preserving. Of our summer visitors the Chiff-chaff was the first arrival, one being seen and heard in the garden here on the 9th of April. The Sandwich Terns, though late, were the next arrivals, a pair being seen in the estuary on the 10th. On the 30th I observed some Little Terns in the channel; and, although no Common Terns came under my notice, yet Mr. H. Scroope, of Ballina, told me that he saw some on Lough Conn on the 3rd of May and heard both Cuckoo and Corncrake on 29th April, also near the Lough. Although Swallows were seen at Ballina about 23rd April, yet none visited Moyview until the 1st May, and it was only on May 7th that the Cuckoo was heard here. On the 27th of April Captain Kirkwood observed a pair of White Wagtails at Bartragh, and securing one bird kindly sent me the specimen. This being the sixth season in succession that *Motacilla alba* has visited Bartragh, I think establishes the fact beyond any doubt, that their line of spring migration to their northerly haunts regularly passes over the Island of Bartragh every year.

ROBERT WARREN.

Moyview, Ballina.

Raccoons at the Dublin Zoological Gardens

A very extraordinary occurrence, which deserves special mention, happened at the Zoological Gardens a few weeks ago. The Raccoons have for some time been placed in an open air wire enclosure surrounding an old tree. They spend the day mostly coiled up on the branches of the tree, while at night they descend and roam about the enclosure. One of the female Raccoons seemed particularly unhappy in her new abode, and after many fruitless attempts managed to scale the fence and make her escape. Probably attracted by the smell of flesh, she made her way through a skylight into the lion-house, and there concealed herself so effectually that for some time she could not be found by the keepers, who were on the look out. However, the night watchman discovered her one evening prowling about the lion house, and she was secured next morning and returned to her old quarters. She had given birth to two young while in the lion house, for the following morning, Flood, the keeper, noticed a young dead Raccoon with one of the Lionesses, and in another cage a living and perfectly healthy Raccoon was found. It had apparently crawled from the floor into the lioness's den, and had not been injured by her, so that the keeper was able to lift out the little Raccoon and restore it to its lawful mother.

R. F. SCHARFF.

Dublin Museum.

AN IRISH SPECIMEN OF DOPPLERITE.

BY RICHARD J. MOSS, F.I.C., F.C.S.

ABOUT fifty years ago Herr Doppler, a German inspector of mines, brought under notice a peculiar black jelly-like substance he had found in a peat bog, and subsequently Haidinger, in his description of the substance, called it Dopplerite, a name by which it has since been known. Through the kindness of Mr. R. Lloyd Praeger I have had an opportunity of examining a specimen of the substance found by Mr. R. Bell in Sluggan bog on E. M'Groggan's farm, near Cookstown Junction, County Antrim. I am indebted to Mr. R. Welch, Belfast, for a sufficient supply of the material for chemical examination. This, I understand, he and Mr. Bell secured at considerable personal inconvenience. The cuttings in the bog were flooded, and they had to bale out the water, as best they could, till the level was sufficiently reduced to enable them to reach the Dopplerite stratum. The bog, which was formerly much deeper, is now about 11 feet in depth. At about seven feet from the surface occurs a black jelly-like layer, about three inches in thickness, thinning out irregularly into the adjoining peat. The jelly is of a velvety black colour, almost of the consistence of india-rubber; it is elastic to pressure, and breaks easily under tension, exhibiting a conchoidal fracture. On drying it becomes very like jet in colour, fracture, and bright glistening lustre.

It seems that this is the first time Dopplerite has been recognised as occurring in the United Kingdom, though it is probable it has not unfrequently been seen. Mr. (afterwards Sir Richard) Griffith, in the report of the Bog Commission published in 1812, refers to a kind of peat occurring in some parts of the Bog of Allen, and his description leaves little doubt that the substance was, in part at least, Dopplerite. Some twenty years ago I remember seeing a jet-like substance in a mass of dried peat, such as is used for fuel, and which I have no doubt was Dopplerite. I am unable to trace this specimen, which I know was Irish. Considering that about a twelfth of the whole area of Ireland is covered with peat, it

seems remarkable that this curious substance has not been more frequently observed. It has been frequently found in the peat formations of Germany and Switzerland. Several interesting occurrences of Dopplerite in north-west Germany have recently been recorded. At Elizabethfehn the stem of a tree, imbedded in sand under peat, was found completely transformed into Dopplerite. In another case a funeral urn, covered with a lid, and containing some fragments of bones, was found filled with Dopplerite.

When Dopplerite in this fresh jelly-like state is pressed on blue litmus paper it turns the colour red. I also find that if placed in water containing alkaline phenolphthalein the pink colour is discharged. In contact with calcium carbonate it liberates carbonic acid gas. My object in getting an additional supply of the substance from Mr. Welch was to find out how much carbonic acid gas a given quantity of Dopplerite liberated. I ascertained subsequently that this had already been done with some German specimens by Professor Immendorff of Jena. He found, in the case of the Elizabethfehn specimen, that the quantity of gas liberated was such as to correspond to 70 per cent. of humic acid in the dry substance. In his paper published in 1898¹ the quantity is given as 90 per cent., but I am informed by Professor Immendorff that there was an error in the calculation.

In a paper read before the Royal Dublin Society on May 18th, I have described the Sluggan specimen, and shown that in chemical composition it is similar to those of German and Swiss origin. I find that the peat from Sluggan bog, immediately associated with the Dopplerite, is very similar to it in chemical composition. The difference is such as to suggest that Dopplerite is derived from peat by a process of oxidation. I have determined the acidity of the Sluggan Dopplerite by Tacke's method, as applied by Immendorff to the Elizabethfehn specimen, and I find the quantity of carbonic acid gas liberated corresponds to nearly 73 per cent. of humic acid in the dry substance. This calculation is based on the assumption that Mayer's formula for humic acid is correct, and that the acid is monobasic. If the more recent results of Berthelot be taken

¹ *Mitteilungen des Vereins zur Forderung der Moorkultur.*

as a basis the figures are not materially different. The specimen received from Mr. Welch was in part imbedded in peat; I determined the acidity of this peat, and found on the same basis of calculation 60 per cent. of humic acid. So little is known at present of the constitution of humic acid that these results must be received with some reserve.

The Sluggan Dopplerite contains in the dry state 5 per cent. of ash, consisting for the most part of iron oxide and lime. In published analyses the ash varies from 2.23 per cent. in a specimen from Aurich to 14.32 per cent. in one from Obbürgen. Dr. Claessen argues from this wide variation that the substances constituting the ash are not essential constituents of Dopplerite, and that, therefore, the substance is to be regarded as consisting chiefly of free humic acid, rather than a humate or humates. In support of this view I find that the Sluggan specimen may be left soaking in strong hydrochloric acid for several days without undergoing the slightest alteration in appearance, and the substance so treated and well washed is undistinguishable from the original both in the moist and dry state, except as regards the ash, which is almost completely removed by the treatment. It behaves, in fact, as a purely organic colloid, insoluble, or very slightly soluble, in acid and in water. There are many points in reference to this interesting substance requiring further investigation. For the present we may provisionally regard it as the nearest approach to humic acid occurring in nature.

Laboratory, Royal Dublin Society.

NEWS GLEANINGS.

Protection of Birds.

We read with pleasure that a branch of the Society for the Protection of Birds has been formed in Belfast. The Countess of Shaftesbury is President. The Secretary is Miss Ethel Magee (Malone Park), who will be glad to give information respecting the Society, and to receive names of new members. An annual subscription of 2*d.* entitles persons to membership, 1*s.* to associateship, and 5*s.* to a copy of each publication as issued. The objects of the Society are the protection of birds, whether British or foreign, from undue destruction.

NOTES ON ARUM MACULATUM.

BY R. A. PHILLIPS.

FOR some time past I have been interested in the distribution of the maculate-leaved form of the Common Arum, and having many opportunities, in the course of long drives in various parts of Southern Ireland during the early spring months, of observing the relative frequency of the spotted and immaculate forms of this plant, I have taken some notes of same. Mr. Colgan's paper in the *Irish Naturalist* of last March led me to look into the matter more closely, and the subsequent interest shown in the subject by other Irish botanists has induced me to publish the results of my observations.

During February, March, and April, when other vegetation is scarce, the Arum leaves are at their best and most conspicuous; after that they begin to decay and become quickly hidden by the rushing tide of early summer foliage. The first thing that strikes one in these early months is the great abundance of the species. For miles along shady roadsides in all directions it is constantly seen, but a botanist going over the same ground during the summer months would probably put it down as a scarce plant.

Although usually considered a denizen of woods, in which habitat it attains its greatest luxuriance, it seems equally at home along roadsides, the corners and edges of pasture fields, and among the fissures in the rocks of the limestone pavements of Western Ireland.

The spotted form, though undoubtedly scarce, is widely spread, and I have seen individuals in nearly every district in which I have looked for it, the exceptions being near the sea and among the limestone crags.

It usually occurs in solitary clumps of one, two, three, or four plants, always accompanied by far larger quantities of the unspotted form. I have seen it in exposed spots on roadsides, in which situation the spotted plants seem weaker and inclined to "go off" earlier than the green ones; in thin copses, and in densely shaded places in woods. In no case did I notice

any difference in soil or situation that would account for the presence or absence of colouring matter in the leaves.

The following is a list of the localities and habitats in which I have noticed it—several places around Cork; roadsides between Tipperary and Cashel (South Tipperary), Ballybrophy and Erril, Abbeyleix and Durrow (Queen's Co.), Kilkenny and Callan, Thomastown and Graignamanagh, New Ross and Graignamanagh (Co. Kilkenny), Cloughjordan and Borrisokane, Borrisokane and Portumna (North Tipperary), Portumna and Loughrea (Co. Galway); on a shady bank by the Nore at Kilkenny; in a wood at Graignamanagh; and by a wall and under trees in Portumna demesne. Some of the Graignamanagh plants produced spotted spathes as well as leaves.

These records cover the occurrence of about sixty clumps. I kept no record of the total number of green and spotted clumps seen, but I have no hesitation in saying that the latter would not amount to $\frac{1}{500}$ of the whole.

Most of the plants examined by me had smooth, flat leaves, but two notable exceptions occurred. At Graignamanagh wood, where very little sunlight could penetrate, one large plant produced spotted leaves with pseudo-blisters, as described by Mr. Colgan, coinciding with the black markings, but with the prominence in this case appearing on the under-surface. A spotted plant close by this had perfectly flat leaves. At Portumna a plant of the *immaculate* form bore similar pseudo-blisters, with the elevations on the upper surface of the leaves without any dark markings whatever. I could not discover that the circumstances under which these two plants grew differed in any way from those of the numerous specimens of normal form growing alongside.

The dark spots which appear on the leaves of several of our British orchids, *i.e.*, *Orchis mascula*, *O. maculata* and *O. latifolia* seem to be of the same nature as those of *Arum maculatum*, and each of these species occurs with spotted and unspotted forms growing in the same localities, and under apparently similar conditions; but further observation is necessary before expression is given as to their relative frequency.

THE PILOT FISH IN IRISH WATERS.

BY R. F. SCHARFF, PH.D., F.L.S.

ON the 9th July last, Miss M. J. Delap, of Valentia Island, Co. Kerry, sent me a fish which had been caught in the mackerel nets the night before. Miss Delap not only noticed that it was a rare fish, but actually recognised that it was a Pilot Fish, (*Naucrates ductor*) and determined to forward it to the National Museum at once.

Although the colours were somewhat faded when it reached Dublin, the broad, vertical, purplish bands with which the fish is ornamented were still well visible. These, and the dark caudal fin, with its white-tipped lobes, alone serve to distinguish the Pilot Fish from its congeners of the Horse-mackerel family to which it belongs. The specimen was 13 inches long and in an excellent state of preservation.

The Pilot Fish is a pelagic species, with a wide distribution in temperate and tropical seas. It often accompanies vessels during long voyages, and the Romans believed that it was kindly disposed towards sailors, helping to guide their ships to the harbour. The fish has occasionally been taken on the south-west coast of England, having followed ships from the Mediterranean, but we only possess a single record of the Pilot Fish having been taken in Irish waters. Dr. Harvey tells us in his "Fauna of the Co. Cork" that a specimen, captured in 1842 at Crookhaven, Co. Cork, was still, in 1844, in the possession of Mr. W. T. Jones, of Cork. As an Irish species, the Pilot Fish is, therefore, to be looked upon as an extreme rarity.

National Museum, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Barn-owl from Dr. M'Kenna, a Curlew from Sergt. W. Shea, a Badger and a Hooded Crow from Mr. W. W. Despard, a Corn-crake from Mr. Little, two Kestrels from Mr. D. M'Cullagh, a Black Cuckoo from Mr. H. B. Rathborne, and a Grey Parrot from Mr. B. Dunnill. Six Racoons have been acquired. The two Giraffes from the Soudan are now on their way to this country, and a special enclosure for their reception is being made.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 13.—EXCURSION TO STRANGFORD LOUGH.—In spite of very inclement weather, fifty-five members and friends attended this excursion, going by rail to Crossgar and driving to Killyleagh, where boats were waiting. Passing through Killyleagh, the house where Sir Hans Sloane—the founder of the British Museum—was born claimed attention. On embarking a strong headwind was encountered which much impeded progress, caused loss of time and entirely prevented dredging. Botanists and zoologists landed on Ringhaddy, and made good collections for future study. Mahee Island was the chief object of interest, and the ruins here were examined with care. Cars were waiting at Ballydorn-quay, which brought the party to Comber, where tea was provided, and the 8.0 train taken to Belfast. During the day forty-one species of birds were observed, among them being Shell-duck, Red-breasted Merganser, Oyster-catcher, Ringed Plover, and two species of Tern.

JUNE 27.—EXCURSION TO GREYABBEY AND BALLYWALTER.—Over sixty members and friends attended this half-day excursion. The well-known Abbey was inspected, and a resolution was passed calling attention to the over-growth of ivy which threatens to destroy the ruins. The owner has since taken steps to put this right. The drive was resumed to Ballywalter-park, where Lady Dunleath had kindly granted permission to examine her wonderful aviary. Hundreds of foreign birds can be seen in the large netting-enclosed forest demesne, about sixty species being kept, among them rheas, cranes, and flamingoes, wandering apparently at will. The President and Mrs. Fennell entertained the large party to tea in the new and picturesque Dunleath Arms Inn, a business meeting being held at which six new members were elected. The 7.0. train was taken at Donaghadee for Belfast.

DUBLIN AND LIMERICK FIELD CLUBS.

JUNE 18-20 —JOINT EXCURSION.—The Long Excursion of the Dublin Club this year took the form of a series of outings with the Limerick Field Club, with Limerick as headquarters. The party leaving Dublin on Thursday, June 18, was a small one, consisting of twelve members and two visitors only. Limerick was reached about half past one and after luncheon at Cruise's Royal Hotel, which was the Club's headquarters for the visit, the party was joined by several members of the Limerick Field Club, and, with the exception of the entomologists, who made a special excursion to Cratloe Wood, proceeded under the able guidance of Rev. J. Dowd, B.A., to inspect some of the objects of archæological and historical interest in which Limerick is so rich. From the Treaty Stone, which was the last visited, the party proceeded in brakes to Parteenalax where they were entertained to afternoon tea by Mr. R. D. O'Brien. After a most interesting account by Mr. Place, of the vicissitudes through

which the adjoining salmon weir on the Shannon had passed during the course of its history, the party proceeded to the weir and watched the process of capturing the salmon, some ten or a dozen good-sized fish being landed. After an hour, spent by some in Mr. O'Brien's most interesting garden and grounds, by others in collecting along the river banks, the party drove back to the city. At Parteenalax, the botanists noticed *Nasturtium sylvestre* and *Scirpus sylvaticus* in great abundance on the Clare side of the river.

At Cratloe Wood the Rev. R. A. M'Clean and Mr. W. F. de V. Kane worked for Lepidoptera, but the dull weather was unfavourable and few insects were on the wing. The best capture was a freshly-emerged specimen of the Orange Moth, *Angerona prunaria*, and a colony of larvae found spun up in a web amongst oak leaves proved to be those of the moth *Rodophæra consociella*, this being the second recorded Irish locality for the species. Messrs. W. S. Kemp and J. N. Halbert collected Coleoptera, amongst these were *Rhynchites minutus*, *Gymnetron labilis* and *Phyllobius pyri*, the last being an addition to the Munster records. A species of longhorn, *Rhagium bifasciatum*, also occurred.

On the following day, Friday, June 19th, a joint excursion of the two clubs took place to Askeaton. On the drive thither several places of archæological interest were visited and the more enthusiastic collectors were frequent in their descent from the brakes in pursuit of the nimble moth or the less elusive plant. A full inspection of the splendid old abbey at Askeaton under the able guidance of Mr. Heuson was made, and luncheon was partaken of amid the ruins of the castle. The neighbourhood was explored and most of the party walked beside the river, over good collecting ground, a distance of some three or four miles. Among the interesting plants noted were *Viola hirta*, *Cornus sanguinea*, *Euphrasia Salisburgensis* (on the Abbey ruins), the handsome thistle, *Silybum Marianum* in abundance, *Salvia Verbenaca*, *Orobanchæ Hideræ* (on the Castle walls), and *Geranium columbinum* (frequent in this district). The most interesting species of Coleoptera found near Askeaton were *Anchomenus oblongus*, *Brychius elevatus* (in the River Deel), *Calambus v.-lineatus*, *Galerucella nymphææ* (the larvae of this beetle swarmed on the leaves of Water Lily) and *Otiorrhynchus rugifrons*. The party then drove on to Adare. Here a halt was made for tea, after which the party divided, one half visiting more particularly the objects of historical antiquarian interest in and around Adare, while the other half proceeded to the Earl of Dunraven's trout hatcheries, where the interesting processes involved in rearing the fish for restocking the river were seen in detail. At the Adare trout hatcheries at least three local ground-beetles occurred; these are *Bembidium æneum*, *B. v.-striatum*, and *B. flammulatum*, all additions to the Limerick records. After returning to Adare the party drove back to Limerick.

On Saturday, the 20th, a joint excursion was made to Lough Gur. On arrival the party was joined by Mr. Grene Barry, who gave an account of the objects of archæological interest. The greater part of the time

before and after luncheon was spent in the exploration of the lake shore and the surrounding country. *Nasturtium sylvestre*, *Ceratophyllum demersum*, and the very rare *Rumex maritimus* rewarded the exertions of the botanists. Lough Gur proved to be an excellent locality for entomology. Owing to the swampy nature of parts of the shore collecting was rather difficult, but the "finds" compensated for the trouble. Omitting a number of the commoner kinds, the following species of beetles are worth noting, as they are new records for the Limerick district. These are *Anisodactylus binotatus*, type form, *Gyrinus minutus*, *Ilyobates nigricollis*, *Philonthus corvinus*, *P. micans*, *Telmatophilus typhæ*, *Donacia vulgaris*, *Sitones ononidis*, *Lithodactylus leucogaster*, *Eubrychius velatus*, and *Erirrhinus athiops*; several of these, including the last mentioned, are additions to the fauna of the south-west of Ireland. Dragon-flies were common, the best capture amongst these being *Brachytron pratense*, of which Mr. Kemp secured a fine pair "hawking" over the reeds on the lake margin. A small gathering of Entomotraca, by Mr. Kane, resulted in the discovery of the following species, none of which are very notable, but only a portion of the collection has, as yet, been examined, and the plankton unfortunately, for want of a boat, could not be collected:—*Daphnia longispina*, O. F. Müller; *Ceriodaphnia megalops*, G. O. Sars; *C. pulchella*, G. O. Sars; *Scapholeberis mucronata*, O. F. Müller; *Chydorus ovalis*, Kurz; *Acroperus harpæ*, Baird; *Simocephalus vetulus*, Schoedler; and *Eurycercus lamellatus*, O. F. Müller. The party subsequently drove on to the residence of Mr. Grene Barry, where they were entertained to tea. An hour or so was spent in the delightful garden and grounds here, and then the return journey was made to Limerick.

Mr. Praeger sends the following list of plants previously unrecorded from Co. Limerick:—*Ranunculus trichophyllus*, *Rhamnus catharticus*, *Anthriscus vulgaris*, *Galium Mollugo*, *Vaccinium Oxycoccus*, *Veronica hederæfolia*, *Ballota nigra*, *Poa nemoralis*, *P. compressa*. New to Co. Cl are:—*Nasturtium sylvestre*, *Sedum album* (established on the Lax Weir). *Helosciadium Moorei* was found at Castleconnell.

The Dublin Club was most fortunate in securing the co-operation of the Limerick Field Club, and their hospitality in providing conveyances as well as luncheons and teas on the field excursions, was much appreciated. The gratitude of the Dublin Club was expressed by the President, Mr. Kane, in a few well-chosen words, and heartily endorsed by the members after luncheon at Lough Gur. The weather, too, was all that could have been desired, so that the excursion as a whole passed off in the most satisfactory and enjoyable manner possible.

A CONTRIBUTION TO THE KNOWLEDGE OF IRISH FRESH-WATER ENTOMOSTRACA.

CLADOCERA.

BY W. F. DE V. KANE, M.A., F.E.S.

IT is now several years since Dr. Creighton, of Ballyshannon, published a paper on this subject, which embraced all the species of Cladocera known in Ireland up to that date, some thirty in number. Soon after its publication I turned my attention to the subject, and received from him most valuable assistance; and subsequently from my friends Canon Norman, Dr. Brady, Messrs. Scott and Scourfield, in the identification of difficult forms and rare species. Though my work has been fitful, and interrupted for the past two years, yet it will be seen that valuable progress has been made; and I have been able to confirm, and in some points amend, the list as it originally stood, consisting of Dr. Creighton's own researches, supplemented by those of others. Such records are embodied in the present list, and indicated by numerals referring to the list given by Dr. Creighton (*Irish Naturalist*, vol. v., p. 92), as follows:—

- iv. Andrews, A., *Irish Naturalist*, vol. ii., p. 24.
- v. Creighton, R. H., *Irish Naturalist*, vol. ii., p. 24.
- vi. Hodgson, T. V., *Irish Naturalist*, vol. iv., p. 190.
- vii. Norman and Brady: Monograph of British Entomostraca, 1867.
- ix. Creighton, R. H., *Irish Naturalist*, vol. v., p. 89.

For all the rest I am myself answerable. Although the result of so small an amount of work has been highly encouraging, a considerable number of the species taken being scarce, or local enough elsewhere to offer some most interesting suggestions relating to distributional and other scientific problems, yet the area of country examined so far is insignificant, and the examination of many of the waters tried has generally been disconnected and incomplete; so that the present contribution affords no sufficient basis for generalization, or for comparison for different districts, or between the larger lakes of Ireland respectively. For, if I except L. Neagh, L. Erne, and the plankton of L.

Oughter and L. Arrow, only a few of the other important sheets of water have been superficially examined—such as L. Melvin (by Dr. Creighton), L. Mask and L. Gill (by myself). Of the contents of the Mullingar lakes nothing is known, nor of the wide expanses of lakes in Leitrim through which the sluggish Upper Shannon winds, nor the Donegal L. Derg, nor the fine lake of the same name below Athlone; L. Conn, also, and Killarney are similarly untried. For the future, however, students of fresh water Cladocera will have the vast advantage of the great work on this group lately published by Lilljeborg, "*Cladocera Sueciæ*," which seems to include all the British genera and species as well as others not yet noticed in these islands. The classification in some degree has been remodelled, and the authority of so learned a master will, doubtless, compel the adoption of his nomenclature and grouping. Hitherto there has been considerable difficulty in identifying the two species of *Diaphanosoma*—namely, *brachyurum* and *leuchtenbergianum*—partly in consequence of the confused synonymy, the names *brandtianum* and *brachyurum* having been applied it would seem to both species in turn by different authors, and partly on account of some of the characters given by Sars not proving constant; for instance, the shape of the head, and also the curvature of the spines on the abdominal claws. It is, therefore, highly satisfactory to find that the name *brachyurum* is for the future definitely attached to the species with proportionally shorter swimming antennæ, which in *leuchtenbergianum* extend up to or beyond the hind margin of the shell valves. Both exist in Irish waters. And, I am pleased to be able to announce *Holopedium gibberum* as Irish, having taken this interesting animal when visiting Connemara in company with Canon Norman in 1901. The important family of *Daphnidæ* has been reduced to more definite groups of genera, and the extreme confusion that hitherto existed in regard to the helmeted forms, seems satisfactorily disposed of—characters having been found which enable the genera and species to be definitely distinguished from one another. Thus, it is satisfactory to find that the presence or absence of the second eye-spot is no longer the main diagnostic between

D. kahlbergensis and what was hitherto termed *D. lacustris*, var. *galeata*, since this mark seems often present in very minute form in *D. kahlbergensis*; while from other specimens which could not be examined alive, this criterion seems absent, having disappeared, owing to their being slightly deteriorated in condition. The helmeted forms are now classed by Lilljeborg as follows:—*D. galeata*, a sub-species or variety of *D. hyalina*; *D. cucullata*, with which both *D. kahlbergensis* and *Jardinii* are sunk as synonyms; *D. cristata*; and, lastly, *D. longicemis*. The *Ceriodaphniidæ* are equally carefully described, and it would seem that the *C. quadrangula* of most English authors hitherto should be *C. pulchella*, and *vice versa*, which necessitates the recasting of the nomenclature of our recent British lists. But it is among the *Bosminidæ* especially that Lilljeborg's work has accomplished yeoman's service. Of this perplexing genus a careful and most elaborate survey has been made, and no less than 222 figures are given illustrating the characters of nine species and sixteen varieties. A careful revision of old records thus becomes unavoidable, and as a reference to the original specimens is too often impossible, at least with regard to the Irish list, several must drop out pending further research. One interesting feature of these unstable forms appears on comparison of the numerous illustrations given; namely, the prevalence among the *Bosminidæ*, and in a less degree also, among other genera of Cladocera, of a modified habit of seasonal dimorphism. Hitherto we have been familiar with the differences of the sexual characters, as well as that between young and adult forms; but it would appear that marked differences of development are also observable between the adults of spring, summer, and autumn of most species of *Bosmina*. Further observations of these phenomena by students of Entomostraca in these countries would be most desirable, in order to insure that local and racial aberrant characters do not confuse the issue, and to test how far this seasonal dimorphism is constant in its effects in different climates, and varied environments. For instance, specimens of *Bosmina mixta*, var. *humilis*, sent by the writer to Prof. Lilljeborg, appear to show that our summer adult females

correspond to vernal Swedish examples in the comparative shortness of their rostra. Examples from L. Erne are characterised by a remarkable absence of development in the spinal processes at the infero-posteal angle of the shell valves, indeed in many instances the angle is almost obtuse, as sometimes obtains in examples of *B. coregoni*; but examples from Lough Conn are like the Swedish type. And this leads me to observe that the differential character relied on by Lilljeborg between these two species seems a rather trivial one, though it may nevertheless be quite reliable. It is the absence in the latter species of the seta which is to be found on the shell valves of most other species near the infero-posteal angle; but which is almost rudimentary and obsolete though still traceable, in the closely allied species *B. mixta*. Of the absence of the seta in the Scottish L. Maben examples (which till lately was the only known British locality), I am assured by that careful and accurate observer, Mr. Scourfield. But specimens of *Bosmina mixta* which had sustained rough treatment and lost the vestiges of the seta, would conform otherwise very closely to *B. coregoni*. Now, it is interesting to find that in a certain part of L. Erne, specimens of *Bosmina* were taken, the greater part of which were referable to *B. mixta*, and a few to *B. coregoni*. If the identification had rested on any lesser authority than that of Prof. Lilljeborg himself, doubts might have been thrown upon its accuracy. The fact of both species occurring together is remarkable. It is unfortunate, too, that in my gatherings at L. Oughter very few specimens of *B. mixta* were taken, and those not very good ones, the test being somewhat discoloured, so rendering examination difficult. It is to be hoped that having such a valuable text-book to consult, the various questions in dispute, and doubtful identifications which hitherto obstructed students of this group will cease to hinder progress, and that before many years we shall reap a rich harvest of valuable facts from our numerous and diversified Irish inland waters. But, although the occurrence of northern species with us, such as these two Bosminidæ and *Bythotrephes Cederströmii*, is of extraordinary interest, as offering in conjunction with other branches of natural history convergent testimony as to the genesis of a portion at any rate of

our insular fauna ; yet, till a much more complete acquaintance has been made with the contents of our marshes and meres, it seems wiser to defer drawing any inferences from such a fragmentary and imperfect instalment of facts as is now in our power to offer. Nevertheless what has been ascertained seems highly suggestive, and should encourage careful and active research into this fruitful though neglected field.

Sida crystallina, O. F. Mull.—This species is not rare in the lakelets and pools of the Counties of Monaghan, Fermanagh, Donegal, Sligo, Clare, Galway, and Leitrim. Abundant in Loughs Erne, Neagh, Ree, Corrib, Mask, Arrow, and Melvin. In the reaches of Upper L. Erne, where *Stratiotes aloides* has made a settlement, this species clings to its leaves in enormous numbers.

Diaphanosoma brachyurum, Lievin.—L. Ballinahinch and Kylemore, Connemara ; Lisdoonvarna, Co. Clare.¹

D. leuchtenbergianum, Fisch.—L. Gill, very abundant ; Lower L. Erne, abundant ; Ballinahinch, Kylemore, and Clifden, Connemara ; Boyne Canal.

Holopedium gibberum, Zadd.—Ballinahinch, Connemara, abundant ; L. Mask, a few.

Daphnia pulex, De Geer.—Everywhere common. Var. *hamat*, occurs at Drumreiske, as identified by Mr. Scourfield. (Dr. Creighton's record of var. *obtusa* he considers to require confirmation.)

D. longispina, Mull.—Glaslough, L. Bawn, and elsewhere in Co. Monaghan ; Lower L. Erne, L. Gill, Clifden lakes, near Galway (vi.) ; lakes of Fermanagh and Donegal (ix.), Boyne Canal ; L. Gur, Co. Limerick.

(*D. psittacea*, Baird.—Drumreiske. Identified as probably this species by Canon Norman.)

D. hyalina, var. **lacustris**, G.O.S.—Dartrey, Co. Monaghan, abundant ; L. Neagh, do. ; Upper L. Erne, a few with *D. cucullata* ; L. Mask and L. Ree, abundant.

Sub-species **galeata**, G.O.S.—Ballinahinch, very abundant ; Kylemore in Connemara ; L. Mask, near Galway (vi.), L. Melvin (ix.), L. Gill, L. Arrow, very abundant ; L. Ree, do., etc.

¹ A *Diaphanosoma*, apparently hitherto undescribed, exists among the plankton of L. Mask, Co. Mayo. Its most salient characters are as follows :—It agrees with *D. brachyurum*, Lievin, in the comparative shortness of the second antennæ relatively to the test. Instead however, of the head being in the direction of the long axis of the body the distal half bends forward at an obtuse angle to the back, and is narrowed and contains the eye. The length of the first pair of antennæ with their seta exceeds the total length of the head. The first example of this species I concluded was a monstrosity, but further examination revealed numerous other examples with the same characters.

- Hyalodaphnia cucullata**, G.O.S. (*kahlbergensis* Sch.)—Upper L. Erne. Taken first there by Dr. Creighton.
- Scapholeberis mucronata**, Mull.—Lakes and bogs in Co. Monaghan; Marsh near Favour Royal in Tyrone; Upper Lough Erne; R. Boyne near Navan; Kilmacduagh in Clare; Lough Corrib (iv.); Lough Gur; Lough Mask.
- Simocephalus vetulus**, Schoed.—Everywhere abundant.
- S. exspinosus**, Koch.—Drumreask, Co. Monaghan; Fermoy, Co. Kerry (Scourfield).
- Ceriodaphnia reticulata**, Schoed.—Glaslough and Drumreask, Co. Monaghan; L. Unshin near Ballyshannon (ix.)
- C. megalops**, G.O.S.—Drumreask, Co. Monaghan; near Galway (vi.); Lough Gur, Co. Limerick.
- C. pulchella**, G.O.S.—L. Neagh, south shore; Upper L. Erne; Glaslough; Lisdoonvarna; Boyne Canal; Lough Gur, Co. Limerick.
- C. quadrangula**, O. F. Mull. (*pulchella* in Mr. Creighton's list).—L. Nabrackalan near Ballyshannon (ix.); lakes at Clifden, Connemara
- C. laticaudata**, P. E. Mull.—Drumreask, Co. Monaghan.
(*Bosmina longirostris*, Mull.—Recorded from Clonhaugh L., near Mullingar. Requires confirmation).
- Bosmina longicornis**, Schoed.—Boyne Canal.
- B. longispina**, Leyd.—Mr. Scourfield thinks that the examples hitherto classed under this designation may probably be referable, in large part at least, to some of the forms included by Lilljeborg under *obtusirostris*. I prefer provisionally to retain them under this designation, leaving future captures to be relegated to their proper position in Lilljeborg's classification. L. Melvin (ix.), L. Bollard, Connemara (vii.); L. Neagh, Lisdoonvarna (vii.)
- B. obtusirostris**, G.O.S.—Specimens I took at Kylemore, Connemara, with short straight rostra, almost certainly are referable to this species.
var. **lacustris**, Lillj.—L. Mask, abundant.
- B. Dollfusii**, Moniez.—Specimens of this, with the claws of the post-abdomen not dentate, I captured in L. Arrow, and in the lakes of Ballinahinch and Kylemore, Connemara.
- B. mixta**, Lillj., var. **humilis**, Lillj.—Upper L. Erne (identified by Lilljeborg), fairly abundant; L. Oughter, a few. I am able to report the occurrence of this northern species abundantly in Lough Conn, Co. Mayo. Summer examples, taken June 30th, correspond in character to figs. 8 and 9, tab. xli. of Lilljeborg's *Cladocera Suecicæ*: the spines at the infero-posteal angle of the test, however, being longer, and so differ from summer specimens from Lough Erne.
- B. coregoni**, Baird.—Upper L. Erne, a few with the preceding species (identified by Lilljeborg.) Dr. Creighton first discovered a *Bosmina* in L. Erne, which was presumed to be referable to *B. coregoni*, but probably must have belonged to the preceding species.

- Ilyocryptus sordidus**, Lievin.—L. Erne, abundant at 12 to 20 feet depth; Killyhoman marsh and pools at Bragan, Co. Monaghan; Lisdoonvarna, Co. Clare.
- Macrothrix laticornis**, Jurine.—Near Belfast, W. Thompson (vii.); Upper L. Erne, one.
- M. rosea**, Jurine.—Lakes in Connemara (vii.)
- Lathonura rectirostris**, Mull.—This rare species was found by Professor G. Brady many years ago in L. Bollard, Connemara. In Ireland it would appear to be widely distributed, as I have taken it in the following localities:—Killyhoman, several; Cornacassa, Monaghan, one; Upper L. Erne, one; Kylemore, Connemara.
- Streblocerus serricaudatus**, Fisch.—Bog lake near the high road, Clifden.
- Drepanothrix dentata**, Euren.—Clifden, one; Kylemore, and L. Bollard, Connemara (vii.); Lisdoonvarna, Co. Clare, several; Upper L. Erne; Bragan, Co. Monaghan.
- Acantholeberis curvirostris**, Mull.—Lisdoonvarna, Co. Clare, very abundant: L. Corrib (iv.); Connemara (vii.); L. Columbkille, Ballyshannon (ix.); Bragan, Co. Monaghan.
- Eurycercus lamellatus**, Mull.—Everywhere common.
- Acroperus harpæ**, Baird.—Very generally abundant. Tirlough-na-franca, Caher-na-glissane, and other Clare lakes. Similarly distributed in Co. Monaghan; Ballinahinch L. (very abundant); Kylemore, Clifden, etc., Connemara; pools in Co. Dublin; L. Arrow, Upper L. Erne; Markree, Co. Sligo; Fermoy, Co. Kerry (Scourfield); Lough Mask, abundant; Lough Gur.
- Alonopsis elongata**, G.O.S.—Lakes near Clifden, abundant; Kylemore and L. Corrib, Connemara; Clonhugh L. near Mullingar (iv.)
- Lynceus quadrangularis**, Mull.—Rossmore, Killyhoman, and Bragan, Co. Monaghan; Ballinahinch, abundant; Kylemore, Renvyle, and Clifden, Connemara; Kilmacduagh, Lisdoonvarna, Ballyvaughan, Kinvara, and Caher-na-glissane, Co. Clare; Fore Abbey, Co. Meath; Lough Mask.
- L. affinis**, Leyd.—Upper L. Erne, one: Killyhoman marsh, Co. Monaghan, one; near Galway (vi.).
- L. rusticus**, Scott.—Rossmore, Co. Monaghan.
- L. tenuicaudis**, G.O.S.—Pond near Dublin, A. Andrews; pools at Bragan, Co. Monaghan, not rare; L. Bresk near Castle Archdale, Co. Fermanagh.
- L. costatus**, G.O.S.—Drumreask, Bragan, and Rossmore, Co. Monaghan; Upper L. Erne and L. Bresk near Castle Archdale, Co. Fermanagh, very abundant; Fore Abbey, Co. Meath; Clifden lakes, Connemara; Markree, Co. Sligo; Lisdoonvarna Lake and bog pools, abundant.
- L. guttatus**, G. O. S.—Bragan and Killyhoman, Co. Monaghan, abundant; Markree, Co. Sligo; Lower L. Erne and L. Bresk by Castle Archdale; Ballyvaughan and Lisdoonvarna, Co. Clare; Kylemore, Connemara.

- Lynceus rectangulus**, G.O.S. (*Alona rectangula*, G.O.S.).—Killyhoman, Co. Monaghan.
- L. rostratus**, Koch.—Lower L. Erne ; pools at Bragan, Co. Monaghan, not rare ; Ballinahinch and Kylemore, Connemara ; Kilmacduagh, Co. Clare.
- Leydigia acanthocercoides**, Fisch., N. and Brady? Schœdler? (no spine at base of claws)—Up. L. Erne (one) : Killyhoman, Co. Monaghan (one).
- Graptoleberis testudinaria**, Fisch.—Killyhoman, Co. Monaghan, very abundant ; Upper L. Erne ; Boyne Canal ; Kilmacduagh and Lisdoonvarna, Co. Clare ; Renvyle and Kylemore, Connemara ; near Galway (vi.) ; Lough Mask, abundant.
- Alonella excisa**, Lillj.—Killyhoman, Co. Monaghan ; L. Bresk near Castle Archdale ; Boyne Canal ; Tirlough-na-franca and Lisdoonvarna, Co. Clare ; Kylemore, Renvyle and Clifden lakes, Connemara. (It is questionable whether the true *A. exigua*, Lillj., has been taken in Ireland.)
- A. nana**, Baird.—Killyhoman, Rossmore, and Bragan, Co. Monaghan, abundant ; Fore Abbey, Co. Meath ; L. Bresk, Co. Fermanagh ; Lisdoonvarna and Kilmacduagh, Co. Clare ; Clifden Lakes, abundant ; Kylemore, Connemara ; near Galway ; Lough Mask, abundant.
- Peratacantha truncata**, Mull.—Drumreask and Killyhoman, Co. Monaghan ; Kylemore, Renvyle, Ballinahinch and Clifden, Connemara ; Lisdoonvarna, Co. Clare, very abundant in lake. A specimen from here with sub-posteal angle of abdomen well rounded and test oval.
- Pleuroxus lævis**, G.O.S.—Killyhoman, Co. Monaghan (one) ; pool at Markree Castle, Co. Sligo, very abundant.
- P. trigonellus**, Mull.—Rossmore and Bragan, Co. Monaghan ; Upper L. Erne, and L. Bresk near Castle Archdale, Co. Fermanagh ; Fore Abbey, Co. Meath ; Kilmacduagh and Caher-na-glissane L., Co. Clare ; near Galway (vi.)
- P. uncinatus**, Baird.—Killyhoman, Co. Monaghan ; Upper L. Erne, not rare. Varieties with straight rostra, and either no teeth at the infero anteal angle, or else they are very slightly represented.
- P. aduncus**, Jurine.—Fermoy, Co. Kerry (Scourfield).
- Chydorus globosus**, Baird.—Bragan and Glaslough, Co. Monaghan ; Upper L. Erne, scarce ; Clifden, Connemara ; Lisdoonvarna, Co. Clare (shell deeply pitted, and margin heavily ciliated toward inferior posteal angle, very local there).
- C. ovalis**, Kurz.—Clifden, Connemara ; Lough Gur, County Limerick.
- C. latus**, G.O.S. and Daday de Dees.—Apparently the abundant species of *Chydorus* in the Lisdoonvarna Lake, Co. Clare.
- C. sphœricus**, Mull.—(*C. calatus*, Schœd.).—Common everywhere.
- C. barbatus**,—Rossmore, Bragan, and Killyhoman, Co. Monaghan ; Upper L. Erne ; Clifden, Connemara.

Polyphemus pediculus, De Geer.—Lough Corrib and Lough Bray (iv.); Lough Columbkille, Ballyshannon (ix.); Lough Mask, abundant; Drumreask and Glaslough, Co. Monaghan; Kylemore and Clifden, Connemara; Lough Erne; Lough Arrow.

Bythotrephes longimanus, Lillj.—Upper Lough Erne (v.); Lough Melvin (ix.); Lough Mask, scarce; Lough Ree; Lough Gill; Lough Arrow.

B. Cederströmii, Schoed.—Upper and Lower Lough Erne, very plentiful.

Leptodora hyalina, Lillj.—Upper Lough Erne (v.); Galway (vi.); Lough Mask, scarce; Lough Caragh; Dahtrey, Co. Monaghan; Lough Gill; Lough Ree; Lough Arrow.

A list of such Copepoda and Ostracoda as have hitherto been recorded from Ireland will follow in a subsequent number.

Drumreask, Co. Monaghan.

NOTES.

BOTANY.

Distribution of *Vaucheria* in Ireland.

In the report on "Freshwater Algæ of the North of Ireland," by W. and G. S. West (reviewed in *Irish Nat.*, April, 1903), reference is made to the distribution of the genus *Vaucheria*. Messrs West did not mean that the genus is absent from Ireland—though the language is somewhat ambiguous—but merely that it had not been observed by them. On sending a specimen, recently obtained at Antrim, to Mr. W. West, F.L.S., he kindly named it as *Vaucheria sessilis*, and referred me to the "Guide to the County of Dublin," published for the Brit. Association Meeting in 1878. Here there is a list of seven freshwater species recorded for the counties of Dublin and Wicklow alone. It seems strange that the genus should have escaped the notice of two such distinguished algologists as the Wests, father and son.

J. ADAMS.

Royal College of Science, Dublin.

Jungermannia capitata Hook. in Co. Down.

I found this liverwort, which is an addition to our county list, growing on patches of moss on rocks by the roadside at Tonaghmore, near Saintfield, in May, 1900. It was in ripe fruit and so could be distinguished from *J. bichenata*, which has been found in similar localities in the county on rocks which have a slight covering of soil and other mosses, not necessarily sub-alpine.

C. H. WADDELL.

Saintfield.

Thuidium delicatulum in Co. Down.

I found a second Irish station for this moss, *Thuidium delicatulum*, Mitten, among the sandhills near the sea at Ballykinler, Co. Down, in September, 1900. It was growing in great abundance, in appearance like a more delicate form of the well-known *T. tamariscinum*. Canon Lett and I first found it in Ireland, in a similar locality to the present, at Magilligan, Co. Derry. While this species is stated not to be confined to sandhills by the coast, in Scotland and Ireland these seem to be its favourite habitats, perhaps because as a southern species it is less liable to frost there.

C. H. WADDELL.

Saintfield.

Arum maculatum again.

Not being a confirmed botanist I have not taken the particular notice of the marking on the leaves of *Arum maculatum* until the correspondence in recent issues of the *Irish Naturalist* drew my attention to the subject. During a walk a few weeks past in the neighbourhood of Rathfarnham I noticed a plant which bore leaves with distinct white, or creamy white blotches, resembling in a marked degree the variegation on the leaves of that useful cultivated store plant, *Caladium argyrites*. Further search revealed quite a number of plants with similar markings interspersed amongst others with the usual green leaves. As all appeared to be growing under the same conditions of soil, aspect, moisture, and exposure, it seems difficult to account for the difference in the leaves except on the assumption that the plants bearing them are of two distinct varieties. If this is so would it not also explain the occurrence of the purple or brown blotches from which the plant derives its specific name? Further observation, and experiments in raising seedlings from the three forms, appears to be necessary to elucidate this interesting point.

W. F. GUNN.

Dublin.

ZOOLOGY.

Cepola rubescens on the Ulster Coast.

A perfectly fresh specimen of this fish was picked up on the shore at Portaferry, Co. Down, on 2nd April. As no one there had ever seen a similar fish, it was sent up to Belfast to be identified, and came into my hands. It was 14 inches long, and agreed in every particular with the figure on plate LXII. of Day. I could not find any previous record of this fish from Ulster, but Dr. Scharff kindly informs me there is an unrecorded specimen in the Dublin Museum, taken by Dr. Creighton at the mouth of the river Erne in February, 1898. This addition to the fishes of Co. Down is preserved in the Biological Laboratory at Larne.

ROBERT PATTERSON.

Belfast.

Merlins and Peregrines.

I do not consider Mr. W. H. Workman's surmise that the Peregrine Falcon (*Falco peregrinus*), is much more common about this district than the Merlin (*Falco aesalon*), to be correct. The Merlin is fairly common on upland moors and mountains all through the Counties of Down and Antrim, while the Peregrine Falcon is only to be seen in a few localities. Several Merlins are shot every year in this neighbourhood, but are not preserved, while I feel confident that almost every Peregrine Falcon obtained in Ireland is stuffed. Hence the apparent disparity in numbers.

NEVIN H. FOSTER.

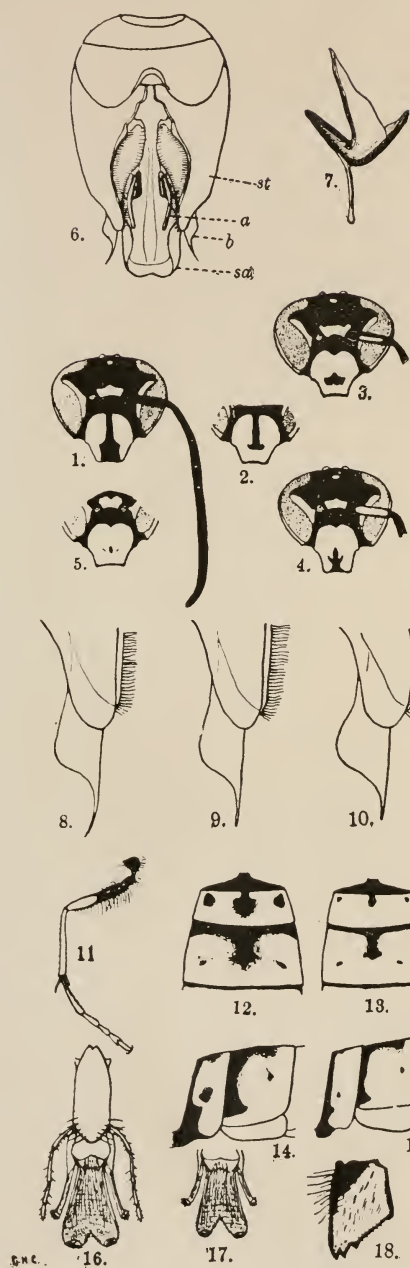
Hillsborough, Co. Down.

Habits of the Woodcock.

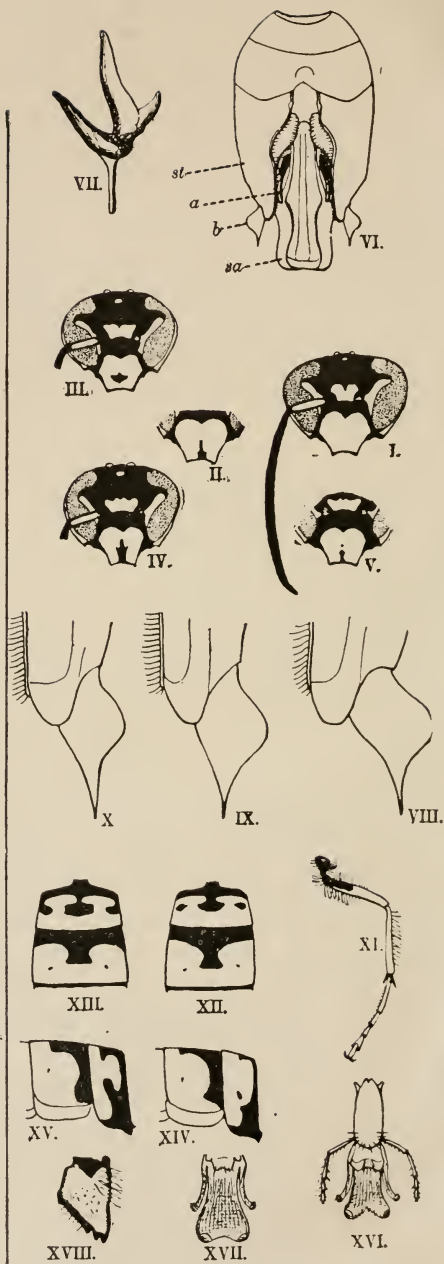
During the past month (May, 1903) I have had constant opportunity for observing a habit in the Woodcocks breeding here that appears to me of enough interest to deserve recording. Every evening soon after sunset they are to be seen in flight just over the tree-tops. They follow one another singly at intervals of several minutes, but occasionally are seen returning, two together. Throughout their flight they keep up a continual deep-sounding "croak, croak, croak." By taking up, evening after evening, a different position, I have been able fairly well to trace the course of their circuit, which they appear to follow round the woods always in nearly the same direction, avoiding, where possible, the treeless spaces. Although only one nest has been actually seen this season, I think there are not fewer probably than half-a-dozen pairs of old birds now here, and perhaps more. I can discover no other purpose in their flight than the exercise of their wings, and perhaps to satisfy themselves that all is well. The time they choose is the peaceful hour after the hawks have gone to roost, and before the owls are yet abroad.

W. E. HART.

Kilderry, Co. Donegal.



VESPA RUFA.



VESPA AUSTRIACA.

THE RELATIONSHIP OF *VESPA AUSTRIACA* TO
VESPA RUFA.BY GEO. H. CARPENTER, B.SC., M.R.I.A.,
AND DENIS R. PACK-BERESFORD, D.L.

[PLATE 2.]

IF the naturalist in Ireland must be content with a somewhat poorer fauna for his studies than his colleagues in Great Britain have at their disposal, he can congratulate himself on being able to find, often in large numbers, species of animals that are uncommon across St. George's Channel. Of particular interest among these is the wasp *Vespa austriaca*, which until the last few years was considered one of the rarest insects in the Britannic fauna. First described as a British wasp by Smith ('43) under the name of *V. borealis*, it was later renamed¹ by him *V. arborea* ('49 and '58), on account of the fact that the specimens first captured in Scotland and near Wakefield in Yorkshire were believed to build nests in fir-trees. Subsequently the species was found very sparingly in other English localities—Gloucestershire and Cheshire (Ormerod, '68; Saunders, '96A), in North Wales (Gardner, '94; Nevinson, '00); in the Clyde and Forth districts of Scotland (Cameron, '75; Evans, '00; Malloch, '00, '01); and its identity with the continental species known as *V. austriaca*, Panzer, was recognised (André, '84). Though both male and queen of the species are known to continental entomologists, workers certainly referable to it have never been found. Smith, however, took, in company with the original queen-types of his *V. arborea*, a peculiar worker-wasp, which he was disposed to refer to the same species. Smith must have taken males also between 1858 and 1868, since both that sex and the supposed worker are figured, from specimens supplied by him, in Ormerod's work, published in the latter year. Then for many years the male of *Vespa austriaca* was overlooked in Great Britain until the Rev. O. Pickard-Cambridge, obtained a single

¹ Because the name *V. borealis* had already been applied by Kirby to a North American wasp.

specimen in Dorset (Saunders, '96B). Males have since been obtained by Nevinson ('00) in Carnarvonshire, and by Evans ('00) in the Edinburgh district. So far as we know the species has in Great Britain a distinctly western and northern range. Saunders has called attention ('02 B) to the difference in the relative frequency of the species of wasps in southern and midland England as compared with Ireland. In Berks and Northamptonshire, *Vespa germanica*--largely outnumbered in Ireland by *V. vulgaris*--is represented by 68 per cent. of the spring-caught queens; while *V. austriaca* is unknown. On the Continent, also, *V. austriaca* haunts mountainous and northern regions. Sweden, Switzerland, the Vosges, the Rhine Valley, Southern Germany, and Western Austria are the districts it inhabits (Thomson, '74; André, '84).

Vespa austriaca was first noticed in Ireland by one of us (Carpenter, '93), who found several specimens among a number of queen-wasps received from Bray, Co. Wicklow. Subsequently its appearance in varying numbers in the same locality was traced through several years by Barrington and Moffat ('01). Freke ('96) mentioned that it was "not very uncommon in the Dublin district," while Buckle ('99) found in Cos. Derry and Donegal several queens and a single male--the first of the sex recorded from Ireland. In the same year one of us (Pack-Beresford, '99) extended the known range of the wasp into Down and Carlow, while two years later ('01) he captured 128 specimens of the male in the latter county; in 1902 again, over 100 males were taken in the same district. A single queen of *V. austriaca* was found by Col. Verbury in the far west of Kerry (Saunders, '02A.).

Much difference of opinion has prevailed among naturalists as to the exact nature of *Vespa austriaca*. Smith, as we have seen, regarded it as an ordinary social wasp, nesting in trees like *V. sylvestris* and *V. norvegica*, and possessing the usual forms of male, queen, and worker. In his British Museum Catalogue ('58) he implies that the insects were actually observed by him building nests in fir-trees, and it might be wondered why this seemingly definite statement by a careful naturalist should have been neglected or discredited by later writers. But reference to his earliest paper on the subject ('43)

shows that the only fact in support of the statement was the presence of nests on trees in the wood where *Vespa arborea* occurred. No evidence is given to connect the insects captured with these nests.

All students of *V. austriaca* have been struck by its similarity to *V. rufa*, and the suggestion that the two wasps are not specifically distinct was made fifty years ago by Schenck ('53). He considered *V. austriaca* as a mere variety of *V. rufa*, bearing the same relationship to the latter as *V. saxonica* is believed by many to bear to *V. norvegica*. This suggestion has lately been revived by Cuthbert ('02), who is struck by the constant association of *V. austriaca* with *V. rufa* in Ireland.

During the last few years, however, the opinion has become established that *V. austriaca* has no workers, but breeds as an inquiline in the nest of some other species. This suggestion as to its habits was first made by Morawitz ('64) and supported by Schmiedeknecht ('81) who, on the ground of its supposed cuckoo-parasitism, proposed a new genus—*Pseudovespa*—for its reception. Holmgren ('83) stated that on an islet of the Baltic off Stockholm he had found *V. austriaca* "comme parasite ou invitée chez une congénère *V. germanica*." We may be pardoned for asking on what evidence this statement rests. But the careful observations of Robson ('98) have been accepted as showing clearly the inquiline relationship of *V. austriaca* to *V. rufa*.

For in July, 1887, Robson observed a worker of *Vespa rufa* dragging from a nest the decapitated and mutilated carcass of a queen *V. austriaca*. It was not until ten years later that he recognised this queen as belonging to the latter species. At the time, he considered her to be the dead foundress of the *rufa* nest, and this opinion he thought well confirmed, when, having taken the nest shortly afterwards, he discovered no old queen within. There were, however, four newly-emerged young queens, and in the cells vacated by them fresh eggs had been laid, presumably by some of the workers. In 1897, having determined as *V. austriaca* the mutilated queen which he had seen dragged out ten years before, Robson made a careful examination of the nest, which he had fortunately preserved. In the central cells of the lower of the two layers of comb, he

found six or eight *austriaca* queens, and in the outer cells of the same layer forty males whose determination was impossible owing to decay. The circumferential closed cells of the upper layer of comb were tenanted by *austriaca* males, while *rufa* males were found in the more internally situated cells.

From these careful observations, then, Robson concluded that the nest must have been founded by a *rufa* queen (because typical males and workers of that species were found in it), and that the *austriaca* queen, which he had seen dragged out, had subsequently invaded the nest as an inquiline "and utilized the energies of the workers of *V. rufa* in rearing her brood of males and perfect females."

The capture on the wing of many male and female specimens of *Vespa austriaca* by one of us, at Fenagh, Co. Carlow, and the discovery, in July, 1902, at the same place of a nest, like that examined by Robson, inhabited by both *V. rufa* and *V. austriaca*, have led us to examine afresh the question of the relationship between these two wasps. We have made a somewhat careful comparison between many individuals of the two forms, especially with regard to the armature and face-markings of the males, and the mouth-parts of the females; and we now publish the main results of our inquiry, together with an account of the nest, which was kept for some weeks under observation in a working state. We propose first to recount the facts that we have been able to verify, and then to suggest the explanation that seems to us the most probable.

The characters by which *Vespa rufa* is usually distinguished from *V. austriaca* are well known to all students of the wasps. The shins of the latter (Plate 2, fig. xi.) are clothed with long hairs not found on those of the former (Plate 2, fig. 11); and in the female, as pointed out by Thomson ('74), the tarsal segments are broader in *V. austriaca* than in *V. rufa*.¹ The basal segments of the abdomen in *V. rufa* (figs. 12-15) are broader than in *V. austriaca* (figs. xii.-xv.). The male armature in *V. rufa* (fig. 6) is broader and darker than in *V. austriaca* (fig. vi.), while the ear-shaped process at the end of the stipes has a characteristic form in either species (compare figs. 8,

¹ But Thomson's statement (writing of *V. rufa*) "tarsis multo angustioribus," seems to us too strongly expressed.

viii.). The face of *V. rufa* has a central black anchor mark, and a rather small and narrow yellow crown mark is found on the black area above (fig. 1), while in *V. austriaca* the "crown mark" is large and deep, and the face, almost immaculate yellow (fig. 1) in the male, shows in the female three black specks of varying size (see Cuthbert's figures, 97B). Moreover, the clypeus of *V. austriaca* is decidedly concave on the lower edge (fig. i.-v.). The scape of the feeler is black in the female of *V. rufa*, and often in the male also (fig. 1), while in *V. austriaca* it has a strong yellow patch in both sexes (figs. i., iii., iv.). The black abdominal markings of *V. rufa* are edged by ill-defined reddish areas (fig. 12), while those of *V. austriaca* stand out clearly from the lemon-yellow ground colour (fig. xii.). The puncturation of *V. rufa* is coarser than that of *V. austriaca*. The general appearance of *V. austriaca* is well seen from the figures of Ormerod ('68, pl. 3) and Cuthbert ('97, pl. 3).

Examination of the large series of these wasps that have passed through our hands shows that most of these characters are fairly constant. In no case have we found any wasp that can be considered as exactly intermediate between *V. rufa* and *V. austriaca*—none that could give rise to hesitation as to which of the two forms it should be placed with. But we have found a number of specimens of *V. rufa* that show very marked variation in the direction of *V. austriaca*, and a smaller number of specimens of the latter that approach in some respects towards *V. rufa*.

Three characters only seem to be absolutely distinctive:—(1) The shins of *V. austriaca* are always hairy; those of *V. rufa* never. (2) The male armature of *V. rufa* is always, as Robson has pointed out ('98), more robust and darker than that of *V. austriaca*. (3) *V. rufa* has the integument more coarsely punctured. All the other characters show more or less variation in different individuals of the two forms, and some of the most striking of these variations will be found figured on Plate 2.

Taking, in the first place, the head-markings, a black anchor-mark on the face (fig. 1) characterises *V. rufa*, while the male of *V. austriaca* has typically an unspotted yellow face (fig. i.) which shows only the slightest traces of the black

dashes that characterise the female. But very extensive variation is to be noticed in both forms. The anchor-mark of *V. rufa* may not reach the edge of the face (fig. 2), or it may become reduced to a central patch (fig. 3), to three minute touches (fig. 5), or to a terminal trident mark (fig. 4). Then, in certain examples of *V. austriaca*, we find that the face shows black marks like those of the aberrant *rufa* males just mentioned (compare figs. 3, 4, 5, with figs. iii., iv., v.). Moreover, in some of these aberrant *rufa* males, it will be seen that the yellow crown-mark above the face is larger than usual (figs. 3, 5), while in the aberrant *austriaca* males it is sometimes smaller than usual (fig. v.). The edge of the face also is less markedly concave in the black-spotted *austriaca* forms (fig. iii.) than in the normal immaculate specimens (fig. i.), while in some of the feebly-marked *rufa* forms it is decidedly concave (fig. 5). The scape of the feeler, which in many *rufa* males is entirely black, as in the queens, may show a yellow patch as large as that which characterises *austriaca* (fig. 3). The males of *V. rufa* vary much more than the females. It is remarkable that no queen or worker of *V. rufa* examined by us shows any trace of yellow on the scape of the feeler, but of twenty-eight queens of *V. austriaca*, five have the usual yellow mark very faint, and in two the scape is entirely black as in *V. rufa*. Further, some *austriaca* queens, taken at Bray by Mr. Barrington during the present year, have a black trident-mark exactly like that of the *rufa* male (fig. 4) referred to above.

Turning next to the abdominal segments, we find that the basal segment of *V. austriaca* is, in many cases, not longer absolutely than that of *V. rufa*, but that it only appears so, because the segment in *V. rufa* is always broader than in *V. austriaca*. Some specimens of the former wasp have, however, the basal segment narrower than usual (fig. 13), and some examples of the latter have it broader than usual (fig. xiii.). There is thus a tendency in each of the forms to vary in the direction of the other; yet the narrowest *rufa* abdomen we have measured is broader than the broadest of *austriaca*. Viewed in profile, the front slope of the basal segment in *V. austriaca* is steeper than in *V. rufa*, though

here also there is some amount of variation (compare figs. 14, 15 with figs. xiv., xv.). We notice that the black markings of the abdominal segments are relatively broader and more truncated in *V. austriaca* than in *V. rufa* (figs. 12, 13, and xii., xiii.), but we possess queens of either form showing the abdominal markings of the shape characteristic of the other. In the typical specimens of *V. austriaca*, the black abdominal markings stand out clear and sharp on the lemon-yellow ground; but fully 25 per cent. of the males of this wasp examined by us show a decided rufous tinge around the black, and in some this is so marked that an examination of the shins or the male armature is necessary before the specimen can be satisfactorily determined. On the other hand, some specimens of *V. rufa* show hardly any trace of the rufous tinge.

It is believed by most students of the Hymenoptera that the male armature furnishes characters exceptionally reliable for the discrimination of species. In *V. austriaca* the appearance of the organs generally is narrower, more parallel-sided, and paler than in *V. rufa* (figs. 6, vi.), as was remarked by Robson ('98). Looking at the details of the armature, we find that there is a fairly constant difference in the form of the stipes (fig. 6, vi., *st.*), and that the appendage at its tip is narrow in *V. rufa*, ending in a very slender flexible point (fig. 6, *b*, fig. 8), but broad and prominent in *V. austriaca*, ending in a straight and more rigid point (fig. vi., *b*, fig. viii.). But in this character, again, there is occasionally a tendency in each species to vary towards the other (compare figs. 9 and 10 with figs. ix. and x.). And it is of special interest to find that this variation in the armature sometimes (not by any means always) accompanies the variation in the face-markings. Figs. 3 and 9 have been drawn from one aberrant male of *V. rufa*, figs. 4 and 10 from another; figs. iii. and ix. from one aberrant male of *V. austriaca*, figs. v. and x. from another. A detail of the armature which seems fairly constant is the process on the inner face of the stipes; this is longer and narrower in *V. rufa* than in *V. austriaca* (figs. 6, *a*, vi., *a*, 7, vii.), and exhibits very little variation in either form.

If the armature of the males of our native wasps be compared, there can be no doubt that a very close likeness between *Vespa rufa* and *V. austriaca* is apparent. The armature in these two species is much more alike than in any other two of our wasps, and it differs from that of the ground-building species (*V. vulgaris* and *V. germanica*) more markedly than from that of the tree-building species (*V. sylvestris* and *V. norvegica*). Indeed, taking all points of structure into consideration, few entomologists would hesitate to arrange our six Irish species of *Vespa* into three pairs—*vulgaris* and *germanica*, *rufa* and *austriaca*, *sylvestris* and *norvegica*—and to admit that *rufa* and *austriaca* are much more nearly akin than the two members of either of the other pairs of species.

Much stress is laid by Robson on a supposed constant difference between the mouth-organs of *Vespa rufa* and *V. austriaca*. "The mandibles [of *austriaca*] are," he writes, "smaller and less rugged, . . . and the ligula or tongue is very distinctly smaller than in *V. rufa*." After examination of a number of females of both forms, we can confirm his statement as to a difference in the mandibles (figs. 18, xviii.), but the difference is exceedingly slight, the mandibles of *V. rufa* resembling those of *V. austriaca* much more closely than those of any other species. *V. vulgaris* and *V. germanica* have decidedly larger mandibles than our two forms—*V. sylvestris* and *V. norvegica* decidedly smaller. The statement as to the relative length of the tongue is true of some specimens, but in this character a more considerable amount of variation than in others is to be noticed. While the tongue of the female *V. rufa* is, on the average, longer than that of *V. austriaca* (figs. 16, xvi.), some specimens of the former have a tongue no longer than that of some examples of the latter (figs. 17, xvii.). Indeed this character, on which it has been proposed to found a generic distinction, is one of the few in which the two wasps show a complete series of connecting links.

Our comparison of the structure and markings of these two wasps shows, therefore, that they are distinct forms which do not merge the one into the other. And yet they are more nearly related to each other than either is to any other wasp,

while in most of the characters distinguishing them each shows a marked amount of variation towards the other. A close kinship between the two is certain, but the particular conclusion that we are inclined to draw from the facts will be better appreciated after our examination of the nest has been described.

Early in July, 1902, what was apparently an ordinary *rufa* nest was discovered at Fenagh. It was at the time so feeble that it was left for a while to develop further. By the beginning of August it was fairly strong, and as the previous year's experience had shown that *rufa* nests taken on August 18th and 19th all contained young queens and drones, a common balloon fly-trap was placed over the hole on August 7th. Next day 78 workers, all apparently typical *rufa*, were caught in this trap.

The next day, by again using the trap and by a little thumping on the ground, 4 or 5 more *rufa* workers were extracted, and then all was quiet, so it was decided to dig out the nest. This was soon accomplished, as it was built in exactly the same sort of position as the *rufa* nests found last year, suspended from the roots of grass, and quite on the surface of the ground. Unfortunately the covering of the nest came to pieces as we were extracting it, but we got out intact the two layers of comb, of which it consisted; these were put on the spot with all the inmates into an insect cage, which was ready for their reception.

On examining the cavity from which we had just taken the nest, a considerable number of wasps were seen crawling about amongst the debris, making no attempt to fly, but burying themselves amongst the scraps of paper, and burrowing into the earth round the sides. They were mostly *austriaca* males, and we extracted them one by one from their hiding places, and put them to join their comrades in the insect cage. Amongst them was discovered an *austriaca* queen, which, by her frayed wings and nearly hairless body, was easily recognised as an old one. On further examining the captures there were found two young *austriaca* queens, a large number of *austriaca* males, one *rufa* male, and in the balloon fly-trap five *rufa* workers.

The nest itself was, in general appearance, very like the smaller *rufa* nests found last year, the paper covering being of the same type as in *norvegica* and *sylvestris* nests, but very delicate and thin. The comb consisted of two layers only, of which the upper measured about 3 inches in diameter, and the lower about $2\frac{1}{2}$ inches. In the centre of the upper layer were 16 or 18 empty cells. Round this came an area, containing between 60 and 70 cells, mostly capped, and outside this again came a belt of cells, for the most part empty, but a few that were capped eventually produced *austriaca* drones. The lower layer of comb was composed entirely of large cells, with the exception of a belt round the outside of about 4 cells deep, which contained larvæ, and in which the cells were unfinished. Inside this belt of grubs came a ring of 25 capped cells, most of which contained queens, while in the centre of the comb were 18 empty cells, several of which seemed to have had wasps in them.

Thus far the nest corresponded very closely indeed with that described by Robson, and it seemed that we had confirmed the view that *V. austriaca* is inquiline on *V. rufa*. We determined, however, to keep the nest under observation, so that as many as possible of the capped cells might hatch out. The five live workers were therefore restored to their comrades, their wings having been first clipped, so that the nest could be examined at any time without risk.

Having supplied them with some honey, we soon had the satisfaction of seeing the workers busily engaged in feeding the larvæ and the young queens and drones. The young queens, too, seemed to take their share of work in feeding the larvæ, first getting their supply of food from the workers. A young queen was never seen going herself to the honey.

During the next week or so queens and drones of the *austriaca* type occasionally emerged from the capped cells, but on August 16th a drone emerged from one of the large cells in the lower layer of comb, undoubtedly referable to *rufa*, but with the face pure yellow, except for a small central black dash, and with yellow spots on the scape of the antennæ. In the course of the next day or two another *rufa* male, very similar, but with three small black dashes on the face

(fig. 5), exactly like those that characterise the *austriaca* queen, appeared, and also a male, which was a typical *rufo*. On August 18th, to our great surprise, an apparently typical *rufo* worker emerged from the upper layer of comb. This was the last wasp to come out, and as there were no further developments by August 31st, we killed off all the living wasps and extracted all the remaining pupæ from the capped cells. These yielded a few more distinguishable *austriaca* queens and drones, and also eleven *rufo* drones, but all of the latter varied in face from the typical *rufo* colouring, and showed more or less likeness to the *austriaca* type.

The following is a complete inventory of the nest:—

PERFECT INSECTS.

Queens.	1 <i>austriaca</i> (old).
	8 <i>austriaca</i> (young).
Workers.	86 <i>rufo</i> .
Males.	46 <i>austriaca</i> .
	3 <i>rufo</i> .
	2 <i>rufo</i> , approaching <i>austriaca</i> .

PUPÆ.

Queens.	3 <i>austriaca</i> .
	5 indistinguishable.
Males.	6 <i>austriaca</i> .
	11 <i>rufo</i> , approaching <i>austriaca</i> .
	14 indistinguishable.

Our comparative study of the structure and markings of *Vespa rufo* and *V. austriaca* has convinced us that the relationship between the two wasps is so very close that it must of itself raise a doubt as to the generally accepted view of the connection between the two being merely that of host and inquiline. We are in complete agreement with the opinion of André (84), that no justification whatever is afforded by structural characters for the removal of *V. austriaca* into a distinct genus. The closeness of its kinship to *V. rufo* may be appreciated by comparing the male armature of these two wasps (Plate 2, figs. 6, vi.) with the corresponding parts in a *Bombus*, and the *Psithyrus* which lives as its inquiline

(figs. A, B). *Bombus* and *Psithyrus* are not very widely separated from each other; indeed, they are probably more nearly akin than any two genera which stand in the relationship of host and guest. Yet the armature in these two bees shows a marked distinction as compared with the slight comparative differences in our two wasps. Compare the large terminal segment of the stipes and the short falcate sagitta in *Psithyrus* with the corresponding parts in *Bombus*.

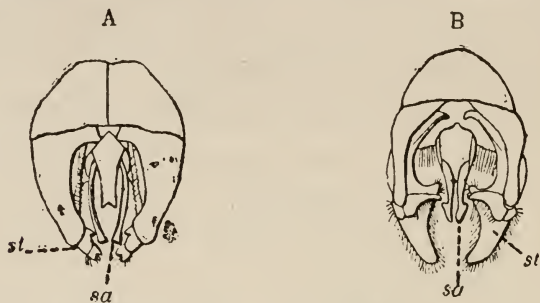


Fig. A. Male armature of *Bombus lapidarius*, Linn. } st. stipes.
 B. " " *Psithyrus rupestris*, Fab. } sa. sagitta.
 After Saunders. Magnified 10 times.

On any view as to their habits, the structure of *Vespa rufa* and *V. austriaca*, and the fact that each form varies in the direction of the other, show that they must have diverged from a common stock in comparatively very recent times. The observations that we have been able to make on the nest containing both forms strongly incline us to the view that, although their differences are apparently "specific," there is a direct genetic relationship between them, and that they may be regarded as races of one and the same species. Unless something altogether abnormal happened in the development of the individuals inhabiting one nest, we are forced to that conclusion. For, during the period when the only old queen in the nest was an *austriaca*, there emerged from the cells males of both forms, including specimens of *rufa* varying towards *austriaca*, young queens of *austriaca*, and a worker of *rufa*; and it is especially noteworthy that the latest wasps to emerge, long after the nest was full of *austriaca* queens and drones, were examples of *rufa*. The *rufa* males which hatched out might possibly have been the offspring, produced

parthenogenetically, of workers of the same form, but this explanation cannot be put forward for the *rufa* worker, and the fact that some of the *rufa* drones varied so markedly towards *austriaca* makes the explanation very improbable for them. We conclude, therefore, that the old *austriaca* queen was the foundress of the nest, and that both the *rufa* and *austriaca* forms are her offspring. The very interesting observations of Sladen ('99) on the habits of colonies of *Bombus*, suggest that our view is not inconsistent with, at least, an occasional "cuckoo-parasitism" on the part of *Vespa austriaca*. For he states that a queen belonging to the *virginalis* form of *B. terrestris* often invades the nest of a colony of the *lucorum* form, kills the rightful queen, and "takes possession of the nest, getting the *lucorum* workers to raise its young."

In support of our view as to the nature of *V. austriaca*, we hope to obtain evidence at some time of actual nest-construction by a queen of that form in the spring. We can only state on this subject at present, that of twenty-three *austriaca* queens captured at Fenagh in the spring of 1902, six were taken on a Nordmann fir, among a number of other queen and worker wasps which were busily collecting fibre for making their nests, and gathering turpentine from the fir-needles, as is their constant habit. Several observers have called attention to the fact that *V. austriaca* is on the wing later than other wasps (Cuthbert, '97; Barrington and Moffat, '01). The observations of one of us at Fenagh, however ('03), tends to show that *V. rufa* is also late in appearing, while its numbers increase in those years when *V. austriaca* is most abundant. It has been pointed out that the latter has a more sluggish flight (Gardner, '94), and emits a louder hum (Buckle, '99) than *V. rufa*.

As regards the precise relationship between *Vespa austriaca* and *V. rufa*, we believe that the former represents the ancestral stock of the latter, because *V. rufa* shows distinctly more tendency to vary, while the rarity and discontinuous distribution of *V. austriaca* suggest that it is the older form. Further, we have seen that *V. rufa* shows several points of resemblance to the tree-building wasps, and that this is still more markedly the case with *V. austriaca*. Attention has been drawn

(Ormerod, '68; Pack-Beresford, '02) to the fact that the nest of *V. rufa* resembles in texture and construction the nests of the tree-wasps more closely than those of the other ground-building species (*V. vulgaris* and *V. germanica*); and that its nest, usually not buried deeply, rests attached to the roots of grasses, in a cup-shaped hollow. It may be concluded from this that *V. rufa* has adopted the habit of building ground-nests rather recently, though it is of interest to note that, at least sometimes, it builds a truly underground nest (Janet, '03). Then we find that *V. sylvestris*, which habitually builds in trees, occasionally makes a ground-nest (Smith, '58); here apparently we see the beginning of the change in habit which has already been carried far by the *rufa-austriaca* race. In most of the points wherein *V. austriaca* differs from *V. rufa* it approaches the tree-wasps (e.g., the hairy shins, the yellow-streaked scape); and we see in this further evidence that *austriaca* is to be regarded as the older form. Moreover, as all the workers of these wasps are clearly referable to *V. rufa*, it seems that *V. austriaca* points us back to a time in the history of the race before the worker had become differentiated from the queen. The workers doubtfully referred by Smith to his *V. arborea* ('43, p. 171; Ormerod '68, pl. 3) might well be considered varieties of *V. rufa* in which the reddish abdominal markings are wanting, while a yellow streak on the scape of the feeler and additional yellow marks on the scutellum are present. Unfortunately he gives no structural details of these workers. Marchal ('96) has shown that, even among our commonest social wasps, a sharp distinguishing line between the two forms of female—the queen and the worker—cannot always be drawn.

Some very interesting problems as to the origin of specific distinctions may, perhaps, be elucidated by the relationship between our two wasps. Their structural differences are quite sufficient to warrant "specific" distinction in the ordinary sense of the term, so that if our view be established, the development of *rufa* offspring from *austriaca* parents would be a very striking instance of "discontinuous variation" (Bateson, '94). It would, indeed, furnish an instance in support of Bateson's theory "that the Discontinuity of Species

results from the Discontinuity of Variation." We think that we see here a new species arise by the production, through many generations, of an increasing number of individuals (*rufa* forms) among the offspring, that are markedly unlike the parents (*austriaca* forms). We believe that *austriaca* forms give rise to *rufa* forms, but we have no evidence of the reverse process; and it seems that those specimens of *V. rufa* varying towards *V. austriaca* must be regarded as examples of reversion towards the ancestral type. The slight but constant difference between the male armature in our two wasps illustrates Jordan's ('96) principle of "mechanical selection," and supports Romanes' view ('97, p. 46) that variations affecting the reproductive organs, and tending to prevent intercrossing between an incipient species and its parent form, arise before any striking differences in the general body-structure become developed. These constant differences between the male armature in the two wasps and the absence of intermediate individuals suggest that interbreeding never takes place, and that *V. rufa* can never be "swamped" by crossing with its parent form, *V. austriaca*. Indeed the latter is now so scarce, that all danger of such "swamping" is past. Except in Ireland, and possibly in some mountainous continental localities, it has been almost entirely superseded by its more vigorous and robust descendant.

REFERENCES.

- '84. ANDRÉ, E.—Species des Hyménoptères d'Europe et d'Algérie. vol. ii. Beaune, 1882-6 (p. 597).
- '01. BARRINGTON, R. M., and MOFFAT, C. B.—Wasps in Co. Wicklow. *Irish Nat.*, vol. x., 1901, pp. 197-201.
- '94. BATESON, W.—Materials for the Study of Variation. London, 1894.
- '99. BUCKLE, C. W.—*Vespa austriaca* in Derry and Donegal. *Irish Nat.*, vol. viii., 1899, pp. 163-4.
- '75. CAMERON, P.—On some new or little-known British Hymenoptera. *Proc. Nat. Hist. Soc. Glasgow*, vol. ii., 1869-75, pp. 304-324.

- '93. CARPENTER, G. H.—Irish Wasps: *Vespa arborea*, Sm. at Bray. *Irish Nat.*, vol. ii., 1893, p. 199. (Also *Ent. Mo. Mag.*, vol. xxix, pp. 166-7).
- '97A. CUTHBERT, H. K. G.—Abundance of *Vespa austriaca*. *Irish Nat.*, vol. vi., 1897, p. 251.
- '97B. A Mysterious Irish Wasp. *Id.*, pp. 285-7, pl. 3.
- '99. *Vespa rufa* in Co. Clare. *Id.*, vol. viii., 1899, p. 163.
- '02. Some Problems of Irish Entomology. *Id.*, vol. xi., 1902, pp. 106-8.
- '00. EVANS, W.—*Vespa austriaca*, Panz. in Scotland. *Ent. Mo. Mag.*, vol. xxxvi., 1900, p. 243.
- '96. FREKE, P. E.—A List of Irish Hymenoptera Aculeata. *Irish Nat.*, vol. v., 1896, pp. 39-43.
- '94. GARDNER, W.—*Vespa austriaca*, Panz. *Ent. Mo. Mag.*, vol. xxx., 1894, pp. 212-13.
- '83. HOLMGREN, E. *Entom. Tidsk.*, vol. iv., 1883, p. 115.
- '03. JANET, C.—Observations sur les Guêpes. Paris, 1903.
- '96. JORDAN, K.—On Mechanical Selection and other Problems. *Novitat. Zool.*, vol. iii., 1896, pp. 426-525, pls. xvi.-xix.
- '00. MALLOCH, J. R.—*Vespa austriaca* in Scotland. *Ent. Mo. Mag.*, vol. xxxvi., 1900, p. 264.
- '01. Aculeate Hymenoptera in Dumbartonshire. *Id.*, vol. xxxvii., 1901, pp. 5-6.
- '96. MARCHAL, P.—La Production et l'Évolution des Gupes Sociales. *Arch. Zool. Exp. Gen.* (3), vol. iv., 1896, pp. 1-100.
- '64. MORAWITZ, F.—Ueber *Vespa austriaca*, Panz. und drei neue Bienen. *Bull. Soc. Imp. des Nat. Moscou*, vol. xxxvii., 1864, pp. 439-49.
- '00. NEVINSON, E. B.—Aculeate Hymenoptera in North Wales. *Ent. Mo. Mag.*, vol. xxxvi., 1900, pp. 62-3.
- '68. ORMEROD, E. L.—British Social Wasps. London, 1868.
- '99. PACK-BERESFORD, D. R.—Wasp Notes. *Irish Nat.*, vol. viii., 1899, p. 209.
- '01. The Male of *Vespa austriaca*. *Id.*, vol. x., 1901, pp. 195-6.
- '02. The Nesting Habits of *Vespa rufa*. *Id.*, vol. xi., 1902, pp. 94-5.
- '03. Notes on Wasps. *Id.*, vol. xii., 1903, pp. 15-17.
- '98. PICKARD-CAMBRIDGE, O.—The Male of *Vespa austriaca*, Panz. *Irish Nat.*, vol. vii., 1898, p. 18.
- '98. ROBSON, J. E.—*Vespa austriaca*, a Cuckoo-Wasp. *Science Gossip*, vol. v. (n.s.), 1898-9, pp. 69-73.
- '97. ROMANES, G. J.—Darwin and After Darwin. Vol. iii. London, 1897.

1903. CARPENTER & BERESFORD.—*Vespa austriaca* & *V. rufa*. 237

- '96A. SAUNDERS, E.—The Hymenoptera Aculeata of the British Islands. London, 1896.
- '96B. Rare Diploptera in Dorsetshire. *Ent. Mo. Mag.*, vol. xxxii., 1896, pp. 212-13.
- '02A. Hymenoptera collected by Col. Verbury in S.W. Ireland in 1901. *Ent. Mo. Mag.*, vol. xxxviii., 1902, pp. 51-5.
- '02B. Wasps in Ireland and Berkshire: a Specific Comparison. *l.c.*, pp. 223-4.
- '53. SCHENCK, C. F.—Beschreibung der Nassauischer Arten der Familie der Faltenwespen. *Jahrb. Vereins f. Naturk. Nassau*, vol. ix., 1853, pp. 1-87.
- '61. Die deutschen Vesparien. *Ib.*, vol. xvi., 1861.
- '81. SCHMIEDEKNECHT, O.—Ueber einige deutsche Vespa-arten. *Entom. Nacht.*, vol. vii., 1881, pp. 313-318.
- '99. SLADEN, F. W. L.—Bombi in captivity and Habits of Psithyrus. *Entom. Mo. Mag.*, vol. xxxv., 1699, pp. 230-4.
- '43. SMITH, F.—Descriptions of the British Wasps. *Zoologist*, vol. i., 1843, pp. 161-171.
- '49. Descriptions of New Species of British Bees [Notes at end]. *Id.*, vol. vii., 1849, p. 1x.
- '58. Catalogue of British Fossorial Hymenoptera, Formicidæ and Vespidae in the Collection of the British Museum. London, 1858. [pp. 218-19].
- '74. THOMSON, C. G.—Hymenoptera Scandinaviæ. Vol. iii. Stockholm, 1874 (p. 22).

EXPLANATION OF PLATE 2.

Fig.

- | | | | |
|------|---|------------|--|
| 1. | Head of typical male <i>Vespa rufa</i> , | face view. | } Magnified 4 times. The hairs are omitted in order to show the markings more clearly. |
| i. | " " <i>V. austriaca</i> , | " | |
| 2. | } Heads of varieties of male <i>V. rufa</i> , face view. | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| ii. | } Heads of varieties of male <i>V. austriaca</i> , face view. | | |
| iii. | | | |
| iv. | | | |
| v. | | | |
| | | | |

- | | | | |
|-----|---|---------------|---|
| 6. | Armature of typical male <i>V. rufa</i> , | ventral view. | } <i>st.</i> , stipes; <i>sa.</i> , united sagittæ; <i>a, b</i> , internal and terminal processes of stipes, Magnified 8 times. |
| vi. | " " <i>V. austriaca</i> . | " | |

7.	Internal process on stipes of male armature <i>V. rufa</i> .	} Magnified 16 times.
vii.	„ „ „ „ <i>V. austriaca</i> .	
8.	Extremity of stipes of male armature, typical <i>V. rufa</i> .	} Magnified 32 times.
viii.	Extremity of stipes of male armature, typical <i>V. austriaca</i> .	
9, 10.	Extremity of stipes of male armature, <i>V. rufa</i> varieties.	
ix, x.	Extremity of stipes of male armature, <i>V. austriaca</i> varieties.	
11.	Third leg of male <i>Vespa rufa</i> .	} Magnified 3 times.
xi.	„ „ „ <i>V. austriaca</i> .	
12, 14.	Dorsal and lateral views of base of abdomen, male <i>V. rufa</i> , to show variation in form and markings.	
13, 15.	Dorsal and lateral views of base of abdomen, male <i>V. austriaca</i> , to show variation in form and markings.	
xiii., xv.		} Magnified 9 times.
16.	Labium and tongue of female <i>Vespa rufa</i> .	
xvi.	„ „ „ „ <i>V. austriaca</i> .	
17.	Tongue (short form) of female <i>V. rufa</i> .	
xvii.	„ (long form) of female <i>V. austriaca</i> .	} Magnified 6 times.
18.	Mandible of female <i>Vespa rufa</i> .	
xviii.	„ „ „ <i>V. austriaca</i> .	

Fig. 1, 6, 8.

i., vi., viii., xii., xiv.

3, 9, 13, 15.

4, 10.

iii., ix.

v., x.

} are drawn respectively from the same individuals.

The series of wasps studied in the preparation of this paper, as well as the nest described, have been deposited in the Dublin Museum.

Dublin Museum.

Fenagh, Co. Carlow.

THE RECORD OF A ROBIN FAMILY.

BY LADY SHAW.

Early in June last our young nestling Robins fluttered to the edge of their nursery, which consisted of the narrowest and highest shelf in our schoolroom, and took to flight. We kept an accurate record of that family of Robins, and I think it may interest those among the readers of the *Irish Naturalist*, who observe the strange and delightful ways of birds. On the 20th April, during the holidays, when our schoolroom was especially noisy, a pair of Robins were seen constantly flying in and out of the window, with leaves, moss, and little threads of hair in their bills. The schoolroom is on the ground floor and the window is ever open. The Robins began a nest on the highest shelf but one on the right hand side of an alcove-press, but when it was half finished they changed their minds and began a second nest on the highest and very narrow shelf on the left hand side of the alcove, between two empty chocolate boxes, and nearer to the window by which they always entered the room. Their work of building was finished by the 25th April, in what appeared to be a very untidy and uncomfortable manner. The Robins continued to fly in and out of the room, the hen occasionally lying in the nest until the 7th of May, when the hen proceeded to lay her first egg. We scarcely believed that the Robins would really attempt to rear a brood in a room where no attempt was made to keep quiet. Great consideration, it is true, was shown her in the way of bread-crumbs, which she greatly appreciated; also, it was arranged not to intercept her on her passage in and out of the room, and to have the window open late in the evening and early in the morning. The Robins, however, took no notice of all the noise that went on in the room, and on the 9th of May a second egg was laid, and on the 11th a third. Then came three anxious days, the Robins showed themselves but little, and we feared they meant to desert, but on the morning of the 14th we found the hen comfortably settled down to hatch, and she looked up fearlessly at us out of her bright eyes, when with the aid of a high music stool we climbed up to peep into

the nest. The cock was much more timid ; he sat on a rose bush outside the window and conversed from a safe distance. During the hatching of the eggs the hen did not sit constantly ; for instance, one day she was observed flying out at 7.30 a.m., she came in again at 7.40 ; she went out again at 8.35, and returned at 8.40 ; left her nest a third time at 8.50, and came back at 8.55. Later on she was seen going out at 10 o'clock and coming in at 10.10 ; out at 11.20 ; back at 11.55, and out again at 12.2. The record of when she returned after 12.2 was not kept, but this account of one morning's flittings is enough to show that the duties of hatching are not as onerous as might be expected.

The little birds made their appearance on the 27th May, thirteen days after the hen began really to sit. And now it was observed that after the first few days, during which time they appeared to get but little food, the three young ones were fed five times an hour, and later on six times an hour. The cock had overcome his fears by this time, and took upon himself his full share in the duties of feeding the family.

At last, on the 9th June, one nestling was found fluttering in a bewildered manner on the schoolroom floor ; it seemed to have its intentions fixed on the outside world, as it always made for a window (of which there were three) and looked up longingly to the light. Eventually we picked it up and put it back into the nest and that night was passed in safety. The next day, however, all the nestlings fluttered and tumbled out of their nursery, and we all spent a restless and unhappy day rescuing them from the back of the piano, the back of the door, or the passage outside the room, and we saw one achieve a flight to the sill of the open window. The hen bird was in a great state of excitement all day ; whether she was pleased or annoyed with the proceedings of the young ones it was hard to make out ; she continued to feed them wherever she could find them, and she never ceased chirping, scolding, fluttering, and darting in and out from morning till night. On one occasion she was seen flying into the room with a large lump of bread ; she went straight to the nest and found it deserted ; she was evidently startled and gave a little anxious cry, and being answered by a melancholy little cheep from the floor, down she flew to the little one, who advanced to meet her with

wide open beak. She rammed the loaf she had procured down its throat ; the piece was far too big, and the small bird in great disgust immediately spat it out. The hen showed her amazement and wrath at this proceeding quite plainly. She stuck her tail up very stiffly and fluttered about, but finally she went off and returned with two small crumbs, which she presented to her captious offspring, to its evident satisfaction.

That day, the 10th of June, the dear little family disappeared. We found it was useless picking the babies up and replacing them in their nest ; they had got past that stage of their existence and were determined to go out into the world. By the morning of the 11th they had all gone, and we must only hope they reached the bushes outside in safety, and are now enjoying life to their hearts' content.

Bushy Park, Terenure, Co. Dublin.

REVIEWS.

ROUND THE YEAR.

Country Rambles : being a Field Naturalist's and Country Lover's Note Book for a Year. By W. PERCIVAL WESTELL. Pp. xvi. + 312 + xxxvi. London : Henry J. Drane, 1903. 10s. 6d.

Mr. Westell, already known to us as the author of an interesting illustrated *brochure* on the behaviour of the young Cuckoo, makes a more elaborate venture in "Country Rambles." This is a collection of natural history notes in the style of a diary. While full of interesting observations, the book is spun out to over 300 pages by the introduction of much matter of which we really fail to see the useful purpose—long unclassified lists of common plants observed in bloom at periods when everyone knows they are in bloom ; lists of birds seen, birds which are to be seen in every parish ; and pure trivialities, such as—"June 3. Beautiful day, brilliant sunshine, nice breezes. It is leafy June now, and the country will never look better than at present." There is an occasional looseness of language too, as in the reference to "Green, and other Flies," and the "seed-pods of the Sycamore." The illustrations are numerous and delightful ; and were the contents of the book evaporated down to one-half their present bulk (with a corresponding reduction in the price), we would cordially recommend Mr. Westell's diary as an incentive to the beginner in field natural history.

R. LL. P.

INFUSORIANS AND THEIR ALLIES.

A Treatise on Zoology. Edited by PROF. E. RAY LANKESTER, LL.D., F.R.S. Part I. (second fascicle). Introduction and Protozoa, by J. B. FARMER, D.Sc., F.R.S.; J. J. LISTER, M.A., F.R.S.; E. A. MINCHIN, M.A., and S. J. HICKSON, F.R.S. London: Black, 1903. pp. vi. + 451. Price 15s. net.

The present work, of which parts II., III., and IV. have already been reviewed in the *Irish Naturalist*, is addressed to the serious student of zoology. It is intended to give him a thorough grasp of the systematic classification of the animal kingdom. This being the aim of the great treatise, it is most desirable to render it an easy and handy work of reference. We note, therefore, with regret, that the original plan of having all the Protozoa along with the Introduction confined to Part I. has not been adhered to, for we now receive only the second fascicle of Part I., containing some sections of the Protozoa and a discussion on vegetable and animal cells; while we are informed that the Introduction, together with the remainder of the Protozoa, will follow in the first fascicle. This peculiar method of publication will lead to the separation, in the completed work, of the Foraminifera from their allies the Radiolaria, Heliozoa, and Lobosa, by the general discussion on animal and vegetable cells, which should surely have preceded the description of all the various classes. As Part II. begins with chapter 2, the first chapter has actually to run through the two fascicular volumes.

All the articles in this volume, except the one by Prof. Farmer, on the structure of the animal and vegetable cells, have a useful bibliographical appendix attached to them. The absence of such an appendix in this one case will be particularly felt, as this section of the volume describes a good many novel points in cell mitosis which students might wish to follow up by consulting the literature bearing on the subject.

Dr. Lister's carefully written article on the Foraminifera deserves due recognition, though we should like to have seen some reference in such an eminently British work to the writings of Mr. Joseph Wright, none of which are alluded to in the Bibliography.

Owing to the recent discoveries of the pathogenic properties of the Sporozoa, the study of these minute parasites in man and beast is exciting a good deal of interest at present. The section dealing with this hitherto much neglected group has been allotted to Prof. Minchin, who seems to possess a thorough grasp of this difficult and complex subject, which he unfolds to us in an excellently written article, so that the perusal even of the 210 pages of Sporozoa is a pleasure. One of the orders of this class of Sporozoa, the Haemosporidia, are parasitic on the red blood corpuscles of vertebrate animals. In many forms the entire sexual cycle takes place in an intermediate host—an invertebrate animal of blood-sucking habits—from which the vertebrate host is inoculated with germs of the parasite. In man and the higher vertebrates generally, the presence of Haemosporidia in the blood causes fevers and agues. The fever known as tropical malaria is due to Sporozoan parasites, which are

introduced into the human body by the bite of a mosquito. As a result of the rapid multiplication of the parasite when it reaches the blood, and the consequent destruction of the red blood corpuscles, anaemia sets in and often terminates fatally.

Probably many of the obscure diseases in our domestic animals are due to Sporozoa. We certainly now know that the "Texas fever" or "Red water" in cattle is a fever produced by a Haemosporidian, and that some fatal epidemics in sheep and pigs are due to Sporozoa (Sarcosporidia) which secrete an active poison within the tissues of the host. It may be noted that the author, Prof. Minchin, is inclined to regard the Sporozoa as descendants of Rhizopod-like ancestors, a view which is not shared by Bütschli and other authorities.

To furnish an adequate account of the structure, life-history, and classification of the Infusoria, and limit it to sixty pages seems a difficult task; for even since Bütschli's great work on that group appeared in 1889 a good many memoirs have been published, as will be seen from the list of papers in the appendix. Yet Prof. Hickson has given us a very readable and well illustrated article of the Infusoria, though he has not added much that is actually new.

The volume concludes with a useful Index, not only of the families, genera and authors, but also of all the technical terms used.

R. F. S.

TOURS IN THE NORTH OF IRELAND.

Official Guide to the Belfast and Northern Counties Railway. 4th edition. Pp. 194. Belfast: R. Carswell & Son, 1903. Price 6d.

We are glad to see that this useful guide-book has now reached a fourth edition. In addition to the matter usual in railway handbooks, Prof. Cole's account of the geology, and Mr. Praeger's of the botany of Co. Antrim, have been revised so as to direct the tourist's attention to the natural interests of the scenery through which he passes. But why are the animals of the district neglected? Surely the wonderful fauna of Lough Neagh is worth a few lines in such a Guide as this. The principal addition to former issues of the work is an excellently illustrated account of the Gobbins' Cliff-path, described in the *Irish Naturalist* a year ago.

BEE-KEEPING.

The Irish Bee Journal. The Organ of the Irish Bee-keepers' Association. Edited by the Rev. J. G. DIGGES, M.A. Pp. 148. Lough Rynn, Dromod. 1902-3. Price 1s.

We are glad to see that this Magazine has completed its second volume. Its success means that the honey industry is spreading in the country, and what a profitable source of income that may be can be learnt by all who will look carefully through the volume before us.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Mongoose from Miss Plews, three Kestrels from Mr. J. F. Martin, a Badger from Sir J. F. Dillon, a West African Crocodile from Mrs. Graham, a Sooty Mangabey from Capt. H. R. Stinke, a Marmoret and pair of Guinea Pigs from Miss S. Jameson, a pair of Squirrels from Mr. G. C. Townsend, and a Surocate from Miss H. Riall. Three golden Agoutis have been born in the Gardens, and a Bonnet Monkey, a Mangabey, and a white-throated Capuchin Monkey have been purchased.

The pair of young Giraffes and the young Lioness from the Soudan, given by Sir Reginald Wingate, have arrived safely at the Gardens, and are now on view to the public. We earnestly hope that the request of the Council to visitors not to offer food to the Giraffes will be attended to. With care and patience, it is to be hoped that these beautiful animals may grow to maturity in their Irish home.

DUBLIN MICROSCOPICAL CLUB.

MAY 13.—The Club met at Leinster House.

Mr. F. W. MOORE showed a petal of a very small, unnamed species of *Cirrhopetalum* from the Himalaya. The petal is very minute, brightly coloured, and fringed with remarkable branching black hairs, which are irregularly toothed.

Mr. G. H. CARPENTER showed specimens of the trilobite *Triarthrus Beckii* recently received by the National Museum from the Ordovician rocks of Rome, New York State, U.S.A. These specimens show distinctly the simple antennules and the biramous body-limbs which are believed to have been present in all the trilobites, showing their close relationship to the typical Crustacea.

Mr. GREENWOOD PIM showed a curious black mould on Laurel leaves from Mr. Walpole's garden at Mount Ussher, Co. Wicklow. It consisted of stiff dark-brown bristles, arising from a small circular base, which did not seem to get below the epidermis, and suggested an early stage of a *Gnomonia* or *Valsa*. Encrusting each bristle was a coating of sugary-looking material, doubtless crystallized "Honey-dew," from which emanated the mycelium of some other fungus. At first sight the sooty coating on the Laurel leaves was mistaken for *Capnodium* or *Fumago*, from which it is quite distinct, though resembling it in its epiphytic, rather than parasitic, character.

Mr. W. F. GUNN exhibited sections of the epidermis of the seeds of *Collomia coccinea*, one of the Polemoniaceæ. The outer coat or testa of the seed consists of numerous elastic spiral fibres, embedded in cells composed of a gummy substance, which is insoluble in spirit. On the application, however, of water, the cell substance readily dissolves, the spiral fibres are released, and uncoil themselves in a most interesting manner.

JUNE 13.—EXCURSION TO POWERSCOURT.—The annual excursion of the Club took place on June 13 under very favourable conditions of weather. Ten members and friends travelled by train to Bray and drove then through Lord Monck's park, along the Dargle to Powerscourt, where, by the kindness of Lord Powerscourt, both demesne and deerpark were freely placed at their disposal. Mr. Anton, the head keeper, conducted the members to the upper region of the deerpark, so that a great variety of plant specimens and associations were observed in the course of the afternoon. After an enjoyable drive back to Bray, the Club dinner took place at the Station Hotel.

DUBLIN NATURALISTS' FIELD CLUB.

AUGUST 1.—NEWBRIDGE BOG.—The third attempt on the part of the Club to reach Newbridge Bog resulted in a small party leaving Kingsbridge terminus under much more favourable climatic conditions than prevailed on the two former occasions, when drenching rain prevented the excursion being carried out. The weather during the day proved delightful. On arrival at Newbridge station the members walked to the south-west portion of the bog, botanising by the way. The conductor, W. F. Gunn, then read some notes written by Dr. Pethybridge, descriptive of the bog flora and its distinctive characteristics. Owing to the absence of experienced botanists and entomologists, the thorough exploration which the bog merits could not be undertaken, but the following, amongst other plants, were noted :—*Drosera*s of two species (*D. anglica* and *D. rotundifolia*) were plentiful, and in the deeper pools *Utricularia minor* was in full flower. The *Sphagnum* and other mosses on which the origin and continued existence of the bog largely depend were well represented, and a number of sedges were observed and other peat-loving plants.

After a drive to Newbridge, and tea at the Prince of Wales' Hotel, the party returned by the 7.40 train.

NOTES.

BOTANY.

The Samphire in Antrim.

Mr. C. J. Lilly sends me fresh young specimens of *Crithmum maritimum* collected by him on chalk rocks near Garron Point. This is a first record for the county for the Samphire, long believed to be absent from the north-east, but now known to be widely spread along the coast of Down.

R. LLOYD PRAEGER.

Dublin.

Archangelica officinalis in Ireland.

At Kilkenny, on May 23, I found a grand plant of this large umbellifer on the bank of the Nore a little below the town, and other plants were subsequently observed on islets in mid-stream, where they were clearly self-sown. The Archangel was formerly cultivated on account of its aromatic leaf-stalks, which were blanched and eaten as celery, and they are still candied and used as a sweatmeat. It is native in eastern Europe, Siberia, and the Himalayan region. In England it is a rare alien; from Ireland there appears to be no previous record, nor have I come across the species as a plant of cultivation. At Kilkenny it appears quite naturalized, and, though July-September is the flowering season given by Babington, the great terminal umbel was already in full bloom on the date above-mentioned. By a strange coincidence, the plant was found independently in the same station by Mr. R. A. Phillips, of Cork, within two hours of my noting it.

R. LLOYD PRAEGER.

Dublin.

Pyrola secunda in Fermanagh.

Early in July I spent a few hours near Carrick Lake, and had an opportunity of searching for the two rare plants which Messrs. Tetley and West's researches have associated with that locality—namely, *Pyrola secunda* and *Trichomanes radicans*. Aided by a description of the spot by Mr. Tetley, I stumbled uphill through a rough natural wood to a low range of Yoredalé Sandstone cliffs, where I came across the *Pyrola* at once—a good patch on a rather dry ledge of rock. An examination of the surroundings showed that it was not the single patch which Mr. Tetley had found. This I soon came across, a little to the eastward, and further eastward two more patches were found. All were just at their best, in full flower, growing on the drier shelves of the wooded cliff. The natural wood around them consists mainly of Birch, with Oak Ash, Mountain Ash, and Holly. The plants actually associated with the *Pyrola* are—*Vaccinium myrtillus*, *V. Vitis-Idæa*, *Lonicera*, *Melampyrum*, *Luzula maxima*, *Hedera*. Both species of *Hymenophyllum* grow on the rocks around, and amid the undergrowth *Lastrea amula* is remarkably abundant and luxuriant, amid boulders and rotting trunks smothered in cushiony mosses. There is, no doubt, more of the *Pyrola* there, for I examined only half—and that the less elevated half—of the low line of rocks to which I had been directed. The elevation of the place is 350 to 400 feet. *Vaccinium Vitis-Idæa*, which grows remarkably abundantly and luxuriantly along these wooded rocks (stems being several feet in length), maintains its abundance down to the stream below (about 300 feet elevation), where it may be found in quantity on mossy rocks and tree-trunks—an unusual habitat for this plant. I had not the good fortune to discover the Killarney Fern. The wood is full of deep mossy hollows and chinks among the blocks of rock, and one might spend several days before feeling that the place was thoroughly explored.

R. LLOYD PRAEGER.

Dublin.

Hieracium sciaphilum in Co. Dublin.

Some years ago when travelling on the Great Southern and Western Railway, my friend, Dr. Scully, saw from the carriage window a plant which appeared to him to have all the aspect of a Hawkweed, growing near the top of a high retaining wall by the railway cutting east of Inchicore. He urged me to examine this part of the line and see whether the plant was really what he firmly believed it to be, a Hawkweed. It was only in June of this year that I found an opportunity of walking along this section of the line, and a very short search was enough to show that a Hawkweed obviously new to the county was established in profusion along the deep cutting between Island Bridge and Inchicore. The plant for fully 100 yards clothed almost the whole surface of the high wall which here bounds the southern side of the cutting and spread all over the opposite or northern embankment for about a quarter of a mile. The plants on the embankment were vigorous and in fine flower; those on the lower parts of the opposite wall, which faces nearly due north, were small and flowerless, only the few which reached fully light and air at or near the top of the wall making bloom sufficient to catch the eye of the passenger travelling by rail on the up-line. My identification of the plant as *H. sciaphilum* (Uechtritz) is confirmed by the Rev. W. R. Lintou, who has kindly examined specimens. Though new to Dublin, Mr. Praeger has already recorded the plant in his *Topographical Botany* from the same railway in Co. Kildare.

NATHANIEL COLGAN.

Sandycove, Co. Dublin.

Ranunculus circinatus in Co. Antrim.

This characteristic member of the Water Crowfoot group of plants I discovered on Saturday, June 27th last, growing abundantly in the Lagan Canal at Aghagallon, County Antrim. Essentially a "Central Plain" plant, it was first recorded from Ulster in 1892 by Mr. R. L. Praeger, who found it inside the County Down area at the junction of the canal with Lough Neagh, three miles to the south-west of the present station. He also found it plentiful at Derryadd Bay, in Armagh, three miles further south-west. I had walked up from the foot of the canal, and first observed it at the Chapel locks, just below Aghagallon; it continued plentiful for fully half a mile. At Aghalee another form, most probably *R. heterophyllus*, was observed, but the specimens secured were hardly satisfactory enough for identification with certainty.

W. J. C. TOMLINSON.

Belfast.

ZOOLOGY.

Land Shell Pockets.

To the current number of the *Journal of Conchology* (July), R. Welch contributes a short paper on "Pockets of Land Molluscs, found on the Portstewart dunes, Co. Derry."

The Dublin Squid.

In the *Memoirs and Proceedings of the Manchester Literary and Philosophical Society*, vol. xlvii. (1903), W. E. Hoyle, Keeper of the Manchester Museum, gives an interesting account of his recent examination of the type specimen of *Loligo eblanae*, Ball. This species, described by the late Robert Ball in 1841, from a specimen found in Dublin Bay, was regarded by him as a *Loligo*, and subsequently by Jeffreys as the female of his *Ommastrephes sagittatus*. It is now generally placed in the genus *Todaropsis*, and known as *Todaropsis eblanae*; the only other species of this genus is *T. Veranyi*, described by Girard in 1889 from a specimen off the coast of Portugal. The result of Mr. Hoyle's investigation is to confirm an opinion, formed by others as well as himself, that these two species are identical, and, therefore, all the specimens of the genus *Todaropsis* are referable to one species, which, in accordance with the rules of nomenclature, should bear the name *T. eblanae* (Ball). The geographical distribution of this species, as at present known, is as follows:--Belfast Lough, Strangford Lough, and Dublin Bay; North Sea; Plymouth; coasts of Spain and Portugal; Mediterranean Sea.

Green Sandpiper in Co. Mayo.

On June 30th I shot a Green Sandpiper (*Totanus ochropus*, L.) on the Yellow River, Foxford. I should think the bird uncommon at this season of the year. It was a solitary bird, in perfect plumage, and had been seen in the locality previously. I now have it preserved.

GODFREY KNOX,

Foxford, Co. Mayo.

The Great Bustard in Tipperary.

In the *Irish Naturalist* for July (p. 198 *supra*) we see a paragraph casting doubt on the Great Bustard shot in Tipperary being a genuine wild bird. We received the same week in December a very fine specimen from Glamorganshire. As two years have elapsed since the fifteen Great Bustards were liberated in Norfolk, and in a recent number of the *Field* every single liberated bird has been accounted for, we may safely conclude that the Irish specimen has not had an assisted passage; we may also remark that both specimens, Irish and Welsh, have been carefully examined by the gentleman who brought the birds to Norfolk, and his conclusion was that they were *bona fide* travellers. Of course there will always be a certain amount of doubt when there is only one occurrence of a species in a locality, but in this instance the two birds were seen for some weeks, and the bird was shot in Wales in the same week in which the Irish specimen was obtained. We cannot find any account of the species having been turned down in Ireland, as was the case with the Tawny Owl obtained in the North of Ireland.

WILLIAMS & SON.

Dame-street, Dublin.

52

NOTES ON SOME ADDITIONS TO THE FLORA OF
COUNTY LIMERICK.

BY M. C. KNOWLES.

SINCE June, 1902, Miss Charlotte O'Brien of Ardanoir, Foynes, has been working steadily at the flora of the Barony of Shanid, the north-western portion of County Limerick, and has been sending me from time to time plants from this district. Among those sent last year were a good number of those on Mr. Praeger's list of desiderata for the county, as well as some of the rarer species that had not been previously recorded from it. These have been already published by Mr. Praeger in his list of "Additions to Irish Topographical Botany in 1902" (*Irish Naturalist*, January and February, 1903).

The plants mentioned in this short paper have all been found during the present year, and for the sake of convenience I group them under three heads;—(1) Those found by Miss O'Brien in the spring; (2) those found by Miss O'Brien and myself during three weeks I spent at Ardanoir last June; (3) those from other parts of the county found by Mr. R. D. O'Brien of Limerick.

In the spring Miss O'Brien began collecting early, and in March sent me *Montia fontana* and *Viola palustris* from the hills behind Ardanoir. About the same time she sent me plants of the spotted form of *Arum maculatum*. In some of these the spathes were spotted as well as the leaves, which is rather unusual, and the leaves showed the pseudo-blisters to which Mr. Colgan has drawn attention. As Mr. Phillips in his "Notes on *Arum maculatum*" in *Irish Naturalist*, August, 1903, says he has not been able to find the spotted form on the limestone crags or near the sea, I asked Miss O'Brien for particulars as to the places she has found it about Foynes, which is mostly on the limestone. She says "As regards spotted Arum. It is very rare indeed on limestone, though I have found it. It is mainly a product of dry stony ground—not limestone. I have not seen it, or looked for it, near real sea; here it grows within 3 feet of seaweed, but this is not a true sea place, though sea plants grow here." In April, Miss O'Brien sent me a further lot of plants, among them *Viola*

silvestris from Boniska, *Veronica hederæfolia*, common about Foynes, but for which no definite record was published, and *Stachys arvensis* from the garden at Ardanoir. The last, though a rare plant on limestone, is frequent about Foynes. In May I received the Salsify, *Tragopogon porrifolius*, in full flower. This plant grows in some quantity with *T. pratense* in the meadows between Robertstown Creek and the railway bridge, and along the railway banks, and seems well established about Foynes. These are the most important of the plants sent to me before June.

In June Miss O'Brien and I confined our attention to the more eastern portion of the Barony, the part in the immediate neighbourhood of Foynes, and we were fortunate in finding a number of very interesting plants. One of the most interesting is *Rosa hibernica*, var. *glabra*, Baker. Mr. Stewart, of Belfast, kindly named this plant for me, but said the naming should not rest on his authority alone, and suggested I should send it to someone for confirmation. I accordingly sent it to the Rev. W. Moyle Rogers, who says "This seems to agree well with authentic specimens of *Rosa hibernica*, var. *glabra* which (as you probably know) Mons. Crépin considers to be *Rosa glauca* x *pimpinellifolia*, a very strong state." Hitherto this plant has only been recorded in Ireland from the north-east. Mr. Praeger in his *Irish Topographical Botany* says "North-east only, where it has rather been lost sight of since Dr. Moore's time (about 1835)." It was growing in a meadow on the banks of the White River, Loughil, near the old mill, among a tangle of Brambles and White Thorn. *Mentha rotundifolia*, *Mentha piperita* and *Tanacetum vulgare* were also in great abundance in this meadow, and quite near Miss O'Brien got *Myosotis repens*, which is wanted for the county, and *Rubus infestus*, Weihe, which Mr. Moyle Rogers says is the first specimen he has seen from Co. Limerick. In *Irish Topographical Botany* the only records are from Co. Dublin and Co. Londonderry. We collected few Roses and were rather early for *Rubi*. The Roses are all varieties of *Rosa canina*, but as the forms of this species have not been worked out in Ireland I give them below for the benefit of those who may undertake the work; they have been named by Rev. E. S. Marshall and Mr. S. A. Stewart. *Rosa canina*,

var. *urbica* (Leman)—White River, Loughil; var. *dumalis* (Bechst.)—roadside near Oldabbey, Foynes; var. *sphærica* (Gren.)—Mount Trenchard, Foynes; var. *lutetiana* (Leman)—banks of Deal River near Askeaton.

In the wood east of Foynes we found *Carex strigosa*, and we got it again at Mount Trenchard, where it grows with *Milium effusum* and *Nicotia Nidus-avis*. The Limerick Field Club have already noted the Bird's-nest Orchis from this locality, but I mention it as I had never before seen it growing in such profusion. I counted over 50 plants in one small bit of the wood.

The Shannon shore yielded many interesting plants, though few that have not been mentioned by Mr. Stewart in his "Report on the Botany of South Clare and the Shannon."¹ We were, however, unable to find *Polystichum aculeatum* which he lists from Foynes. *Agropyron pungens* and the variety *Lecoqii* of *Papaver dubium* are two that have not been recorded from the county before. On the mud-flats and in the salt-marshes at Robertstown Creek, a large inlet of the Shannon about 2 miles east of Foynes, I found what looked like an unusually large form of *Glyceria maritima* growing in great abundance. I sent this with other plants to Mr. A. Bennett, who said "a puzzling plant, with much the aspect of the French *G. Foucaudii*." Hearing from Mr. Praeger that the Rev. E. S. Marshall had found in a similar salt-marsh in Kent, a plant which had been named by Hackel as *G. Foucaudii*, I at Mr. Praeger's suggestion sent Mr. Marshall my specimens to see if they agreed with his. Mr. Marshall says "I think that your sheet of *Glyceria* can hardly be separated from my herbarium specimens gathered in a 'fat' ditch near Grain, W. Kent, in June, 1892, though the glumes are more glabrous." He very kindly sent me his specimens to see, and so far as I can judge they seem to be the same plant. But there the matter must rest till I can get fresh specimens next year to send to Prof. Hackel, the describer of *G. Foucaudii*. In Barrygone bog, which is really a large swamp

¹ *Proc. R.I. Acad.*, 3rd s., i. 343-369. 1890.

rather than a bog, in a grove of *Cladium*, *Phragmites*, and *Juncus*, we made two new records—*Equisetum variegatum*, var. *majus*, and *Carex Hornschuchiana*, also *Carex stricta*, which has been already recorded from Co. Limerick, though not from this district. On high ground near among scrub of Oak, Sloe, White Thorn, and Spindle-tree we found *Juniperus nana* growing, and in the fields near the village of Barrygone we saw the Opium Poppy, *Papaver somniferum*; the fields were quite gay with it. On the railway bank near the Robertstown Bridge, I got the Bee Orchis, *Ophrys apifera*; there was quite a little colony of it. *Centaurea Cyanus* is another plant we found on the railway close to the station at Foynes. Of other new records from this district we have *Glyceria plicata* from a stream near the quarry at Foynes, *Fumaria pallidiflora* from the garden at Ardanoir and fields near Robertstown, *Orobanche minor*, of which Miss O'Brien got one plant of this by the roadside east of the village; *Viola canina*, *Polygala oxyptera*, *Carex flava* var. *minor*, all from the hills behind Ardanoir, *Lycium barbarum*, which grows by the roadsides near cottages, and *Alchemilla vulgaris* var. *alpestris*, from Ardanoir. This was the only specimen of *Alchemilla* we found in the district, where it is apparently a very rare plant. *Galium Mollugo*, var. *insubricum*, is another new record. Mr. Bennett, to whom I sent this labelled *G. Mollugo*, remarks "a curious form connecting *Galium elatum*, Thuill. (our common form) and *Galium latifolium*, Wall. = *Galium insubricum*, Gaud., having the leaves of the former with the inflorescence of the latter broadly." Miss O'Brien sent me this in July from the roadside near Ardagh, also some very fine specimens of *Lepidium Draba* in fruit from the railway near Elmhill, Ardagh, where it is plentiful.

Mr. O'Brien's finds comprise *Carex curta* from Castleconnell bog, a rare plant and chiefly found in the North according to *Irish Topographical Botany*, and *Polygonum Convolvulus* var. *subalatum*, which he says seems to be the common form about Limerick. Among a collection of plants which he gave me from the docks and Carey's Road quarry are some gathered this year that have not been noticed before. Among those from the docks are *Solanum nigrum*, which is no more than a casual in most places where it occurs; *Malva*

borealis and *Thlaspi arvense*. *Lepidium Draba* and *Lactuca virosa*, both of which are recorded from here by Mr. Praeger, are still to be found. Among those from Carey's Road quarry are *Matricaria discoidea*, which has now got south of the Shannon, and some very fine plants of *Lepidium perfoliatum*, and *Coronilla securidaca*. This last plant has also lately been sent to me by Miss O'Brien from Cahirmoyle, where it has appeared on the hen-run.

I have to thank Mr. Colgan for kindly looking through these casuals and naming those I found too puzzling; also those botanists who helped me with the critical species—Mr. S. A. Stewart, Mr. Praeger, Rev. W. Moyle Rogers, Rev. E. F. Linton, Rev. E. S. Marshall, and especially Mr. Arthur Bennett, to whom I sent the bulk of our three weeks collecting.

The additions to the flora of County Limerick sum up as follows:—

<i>Fumaria pallidiflora</i> .	* <i>Lycium barbarum</i> .
<i>Viola palustris</i> .	* <i>Orobanche minor</i> .
<i>Viola silvestris</i> .	<i>Stachys arvensis</i> .
<i>Viola canina</i> .	<i>Juniperus nana</i> .
<i>Polygala oxyptera</i> .	<i>Carex curta</i> .
<i>Montia fontana</i> .	<i>Carex strigosa</i> .
<i>Rubus infestus</i> .	<i>Carex Hornschuchiana</i> .
<i>Rosa hibernica</i> , var. <i>glabra</i> .	<i>Milium effusum</i> .
* <i>Matricaria discoidea</i> .	<i>Glyceria plicata</i> .
* <i>Centaurea Cyanus</i> .	<i>Agropyron pungens</i> .
<i>Myosotis repens</i> .	<i>Equisetum variegatum</i> , var.
* <i>Solanum nigrum</i> .	<i>majus</i> .

The following varieties also are unrecorded from the county:—

Papaver dubium, var. *Lecoqii*; *Alchemilla vulgaris*, var. *alpestris*; *Rosa canina* vars. *lutetiana*, *sphærica*, *dumalis*, and *urbica*; † *Galium Mollugo*, var. *insubricum*; *Polygonum Convolvulus*, var. *subalatum*; *Carex flava*, var. *minor*.

Science and Art Museum, Dublin.

BOTANIZING IN THE ARDS.

BY R. LLOYD PRAEGER., B.A., M.R.I.A.

THE Ards, anciently *Ard-Uladh*, "the High Land of Ulster," is the name given to the peninsula, some 20 miles in length by 3 to 4 miles in breadth, which lies between Strangford Lough and the Irish Sea, in County Down. A line drawn from Newtownards to Donaghadee will conveniently bound it on the north, while on all other sides it is fringed by sea. The area thus enclosed is about 95 square miles, or one-tenth of County Down. This is a low-lying, fertile, and highly cultivated district, its average elevation being not more than perhaps 100 feet, the highest point 339 feet. Silurian slates, usually with a drift-covered and undulating surface, everywhere prevail, save for a strip of Bunter sandstone along the head of Strangford Lough. The Ards forms the most easterly portion of Ireland, and its low coast-line, fringed with reefs extending far out to sea, is one to which vessels going up or down channel give a wide berth.

The flora of this district, like that of the rest of the well-worked north-eastern counties, has attracted many observers. John Templeton botanized here occasionally in 1793-1806, or thereabouts, with his usual perspicacity: and it was a pleasure to me to verify several county-records which, during the intervening century, had rested on his authority alone. Later, S. A. Stewart examined the district; and T. H. Corry, C. H. Waddell, S. A. Moore, J. H. Davies, and others, have also contributed to our knowledge of its flora. There were indications, however, that the Ards might still yield some treasures to a systematic examination, and this I had an opportunity of making during the last week in July of the present year. As in the case of the adjoining Ardglass district, examined last season, attention was concentrated on the untilled ground. The outer coast of the Ards, which includes about 35 miles of shore-line, was examined with some care, as also the greater part (especially the lower portion) of the 30 miles or so of shore-line fronting Strangford Lough. In the southern half of the Ards several lakes occur, also a number of marshes; these also claimed due attention. Certain good

species, neither halophile nor hydrophile, turned up as side issues to the examination of the coasts and watery places.

I may at once summarize as follows the best plants which I have to record :—

New to the British Islands, *Glyceria festucæformis*.

New to Ulster, . . . *Valerianella Auricula*.
Chenopodium rubrum.
Carex divulsa.

New to District XII., . . . *Geranium columbinum*.

New to County Down, . . . *Glyceria plicata*.
Lastrea spinulosa.

Extensions of range, or new stations for rare plants :—

Thalictrum dunense. . . *Ceratophyllum demersum*

Crambe maritima. . . *Juncus obtusiflorus*.

Agrimonia odorata. . . *Typha angustifolia*.

Ligusticum scoticum. . . *Potamogeton plantagineus*

Mertensia maritima. . . *Cladium Mariscus*.

Atriplex portulacoides. . . *Carex teretiuscula*.

Hydrocharis Morsus-ranæ.

Considerable interest attaches to the first of these, *Glyceria festucæformis* Heynhold ex Reichb. *Fl. Germ. Excurs.*, 45. 1830, inasmuch as it is not only a species hitherto unknown in the British Islands, but one with a range as characteristically Mediterranean as that of several of the famous plants of South-west Ireland. According to Nyman (*Consp. Fl. Eur.* and *Suppl.*, 1890), it occurs on the coasts of S. France, Sardinia, N. Italy, Dalmatia, Turkey, S.W. Russia, and (?) by a lake in Hungary.

The discovery of the plant is, in one sense, due to a farmer who, wishing to take a crop of hay off one of his meadows fronting the lough, railed in a portion of the foreshore along with his field. This allowed the maritime vegetation to shoot up, while everywhere else along the shore it was closely cropped by cattle. While traversing this portion of the beach, which lies just north of the rocks at Marlfield Bay, my eye was at once caught with this tall upright *Glyceria*. It grew between two and three feet in height, with stems slightly arching at the top, and leaves a foot long, and was immediately distinguishable from *G. maritima*, which grew near, by the above features,

and by its broader leaves and much stouter build. Having once noted its characters, it was easily traced along the shore, even though it was everywhere else eaten down, often to a stiff brush-like stump. The shore here is formed of Boulder-clay, generally covered with a few inches of angular stones derived from the clay. Among the stones, below spring-tide level, are scattered clumps of *Glyceria maritima* and *Aster Tripolium*. *G. festucaformis* is associated with these, but generally grows a little farther down the beach, being the lowest plant of all. It grows in small solitary clumps, and I traced it from the point before-mentioned northward along two miles of shore to Old Man's Head; and on a subsequent day, striking the lough just north of the mouth of the Blackstaff River (two miles north of the point last-mentioned), I saw it again.

That the plant is indigenous, there can be no shadow of doubt. In the whole of Strangford Lough there is no port where foreign vessels call. The sea traffic is confined to small local boats with cargoes of coal, bricks, and so on. Introduction by land is equally out of the question. The place is remote from railways and even from roads, and the plant grows amid a strictly indigenous flora.

Unable to match the grass with any form of British *Glyceria*, I sent specimens to Mr. Arthur Bennett. He forwarded them to Prof. Hackel, who writes in reply—

“It belongs to *A. festucaformis* [Heynh. in] Reichb., but the spikelets and flowers are as large as in *A. Foucaudii* Hackl. ap. Foucaud in Bull. Soc. Bot. Rochell., 1893, 173, of which it has also the habit. But in *A. Foucaudii* the culm is thin-walled, the central cavity being very large; in *festucaformis* the culm is firm, thick-walled; the leaves are flat in *A. Foucaudii*, junciform [?] in *festucaformis*. We must name it *A. festucaformis* ad *A. Foucaudii* vergens.”

In transmitting this note, Mr. Bennett remarks:—

“You will see of what great interest your grass is—another link in Ireland to a southern flora.”

The *A. Foucaudii* referred to was described in 1893, from specimens collected in the department of Charente Inférieure, W. France, but there appears some doubt as to whether it is now looked on as a good species or as a luxuriant extreme form of *G. maritima*. Rev. E. S. Marshall has gathered it in

Kent (*Flor. Kent*, p. 405), and Miss Knowles collected a grass like it in Limerick this year (*ante*, p. 251).

Though placed under *G. distans* in "Index Kewensis," *G. festucaeformis* is looked on as a distinct species by most European botanists, and will be found treated as such in the leading floras, such as Grenier and Godron's *Flore de France*, Bubani's *Flora Pyrenæa*, Parlatore's *Flora Italiana*, Reichenbach's *Iconographia Botanica*, Nyman's *Conspectus*, and Richter's *Plantæ Europææ*. The Irish plant will be described and figured in an early number of the *Journal of Botany*.

We have grown accustomed to associate the occurrence of Mediterranean, or other southern species in Ireland, with southern or western ranges in this country (e.g. *Arbutus Unedo* and *Habenaria intacta*, which are widely spread Mediterranean plants, *Dabeocia polifolia*, *Saxifraga umbrosa*, &c.); and the occurrence of a Mediterranean species in the North-east of Ireland appears a startling anomaly. A little thought, however, tends to lessen one's astonishment. The Cantabrian group and other southern species of similar range in Ireland are as a rule upland plants, favouring a damp warm climate, and in many cases a peaty soil. They are a hygrophile-frigofuge group on the whole; and the hills of western Ireland supply just such a habitat as they like. *Habenaria intacta*, the only one with any xerophile tendencies, chooses the dry warm limestones. But a sea-shore plant like *Glyceria festucaeformis*, assuming its occurrence anywhere in Ireland, one could not so confidently expect to find confined to the west. The western maritime flora is scanty compared to the eastern, and the habitat of this plant would protect it from frost in any part of Ireland. Furthermore, we find in the fauna a remarkable eastern range in Ireland of certain forms southern in Europe; this feature now at last finds a parallel among plants. The fine beetle, *Otiorrhynchus auropunctatus*, inhabiting the Pyrenees and Auvergne, and absent from Great Britain, ranges in Ireland along the *east* coast from Wicklow to Donegal. The snail, *Helix Pisana*, spread widely along the Mediterranean, reappears in Madeira and the Azores, S. Wales and Cornwall, and in Ireland along the *east* coast from Rush to Drogheda. The Dublin House-spider, *Tegenaria hibernica*, finds its nearest ally in a Pyrenean species. The

famous "Howth Moth," *Dianthæcia luteago* var. *Barrettii*, long believed to be confined to that peninsula, is now known to have elsewhere a characteristically south-western range in the British Isles, embracing Cornwall, Devon, Wales, Cork, and Waterford. On the other hand, we have Lusitanian animals which follow the south-western range of *Saxifraga Geum* and *Pinguicula grandiflora*, notably the famous Kerry Slug, *Geomalacus maculosus*. So that, of those southern animals which reach Ireland, some range up the west coast, others up the east coast. It strikes one as not unnatural that the same thing should happen in the flora.

As to the other rarer plants in the list above, *Valerianella Auricula* is, of course, a colonist; its occurrence in profusion in several fields in two different localities may be taken as evidence that the seed did not come with this particular year's crop, but that the plant was already established on the district. I fancy it has been overlooked in Down. *Chenopodium rubrum* was recorded from "side of the shore near Ballyhalbert" by Templeton in 1799; also subsequently from Holywood and Belfast, in both of which places it is long extinct. These are the only Ulster records, and I bracketed them in *Irish Top. Bot.* The most southern of the three stations now recorded is within three miles of Ballyhalbert, so quite possibly it exists in Templeton's actual station still. *Carex divulsa* was a quite unexpected find. Laytown in Meath, 60 miles to the south-west, is the nearest station of this plant, which, as previously known, was limited to the southern half of Ireland. *Geranium columbinum* previously rested its claim to admission into the Ulster flora on a single old record for Tyrone by Admiral Jones; though generally found on limestone rocks, it is by no means confined to such, and its environment in the Down station provides no evidence in favour of introduction there. *Crambe maritima*, extinct in Donegal and in Antrim, maintained its place in the Ulster flora solely on Mr. Stewart's Quintin record, already over twenty-five years old. I searched carefully the definite locality which he gives (*Fl. N.E.I.*), but no trace of the plant could be seen, and it is undoubtedly extinct there. Having thus expunged the Sea-kale from the Ulster flora, it was the greater pleasure to restore it a couple of hours later by verifying Mr. S. A. Moore's report by

the finding of a fine colony a few miles to the southward. The occurrence of *Potamogeton plantagineus* in a second Ulster locality is likewise welcome. *Ligusticum scoticum* has such a restricted and definite range in Ireland—Tory Island to the Copelands—that an extension southward of 12 miles is of some interest. Similarly, a northward extension of the Irish range of *Atriplex portulacoides*; last year I traced it from Dundrum round the coast to Gun's Island; now its limit is extended to Green Island, near Portavogie. *Hydrocharis Morsus-ranæ*, as regards its Down record, rested, like *Chenopodium rubrum*, on Templeton's unconfirmed authority; and, as in the case of the Red Goosefoot, the observation of our first northern botanist is shown to be correct.

A brief comparison of the Ards flora with that of the adjoining Lecale district, which I explored last year, may be of interest. The two areas are in most respects very similar. Both are of no great elevation, undulating, highly tilled, formed of slates and grits. Both have an extensive shore line, with sands, shingle, and jagged rocks. Of the maritime species, several of the interesting Lecale plants are shown to have their northern Down limit in the Ards—*Thalictrum dunense*, **Glaucium flavum*, *Raphanus maritimus*, *Mertensia maritima*, **Atriplex portulacoides*; while some others have not yet been found north of Lecale—**Artemisia maritima*, *Carlina vulgaris*, *Statice occidentalis*. An asterisk is appended above to such species as have their Irish northern limit in the district mentioned. On the other hand, *Ligusticum scoticum* finds its southern limit in the Ards; and *Crambe maritima* and *Chenopodium rubrum* also are absent from the Lecale coast. As regards the Trefoils (*T. striatum*, *T. filiforme*, *Trigonella ornithopodioides*) which formed such a marked feature in the Lecale flora, no trace was seen in the Ards. But this negative evidence is of little value, for they were looked for under most unfavourable conditions. The drought of May and June had shrivelled the early summer vegetation on the rocky knolls, and July rains had covered them with a rich crop of later summer plants. Under the same circumstances, I doubt if I should have found any of these Trefoils in Lecale; and I think it probable that some of them—*T. striatum* at least—will yet turn up in the Ards. There is plenty of exactly suitable ground.

Another feature of Lecale was the frequency of small rock-basins filled with marsh with a floating felted covering, in which local rarities, such as *Juncus obtusiflorus*, *Cladium Mariscus*, *Carex teretiuscula*, and *C. filiformis* grew in surprising profusion. In the southern half of the Ards a good many such basins occur, but the felty covering is not developed to such a marked degree. Some of the basins are still occupied by open water; others are silted up; others, again, have been drained. As a result *J. obtusiflorus* is rare; *Cladium* and *C. teretiuscula* were seen in only one station each; and *C. filiformis* was not found. *Rumex Hydrolapathum* and *Scirpus pauciflorus*, both common in Lecale, *Stellaria palustris*, and *Chara polyacantha*, were not seen in the Ards; against these, *Ceratophyllum demersum*, *Hydrocharis Morsus-ranæ* and *Typha angustifolia*, absent from Lecale, are common in the southern Ards. As to the Ards lakes, Lough Cowey, the largest, is excellent ground, and yields an interesting flora: the enormous forest of *Typha angustifolia* which surrounds it is alone worth going to see. Ballyfinragh Lough has been partially drained, and proved totally unproductive. Ballyherly Lough looked more barren still, but redeemed itself to some degree by yielding *Ceratophyllum* to the dredge. As regards plants of light soils, pastures, &c., Lecale is locally remarkable for the abundance of Poppies, all four British species being present; in the Ards only *P. dubium* and *P. Rhæas* are found, the latter quite sparingly. Lecale likewise yielded *Teesdalia nudicaulis*, *Carduus crispus*, *Leontodon hirtus*, *Orchis pyramidalis*, not found in the Ards: the Ards can set against these *Geranium columbinum*, *Valerianella Auricula*, *Carex divulsa*, unknown elsewhere in District XII.

In County Down, peat bogs were never a conspicuous feature, but in old days a string of large bogs stretched down the Ards peninsula, and no doubt an abundant bog flora prevailed in this extreme eastern part of Ireland. By the time that botanists came on the scene—a hundred years ago—the Ards bogs were already much reduced by turf-cutting. They continued to dwindle rapidly, so that by botanists still living *Drosera anglica*, *Vaccinium Oxycoccus*, and *Andromeda Polifolia*, have been seen (now nearly forty years ago) in one spot only, the Wolf Island bog, north of Carrowdore. At the present time Wolf

Island bog can boast only a very small piece of the original surface, and that is now quite drained, covered with *Myrica*, *Scirpus cæspitosus*, and *Molinia*. *Andromeda*, a plant impatient of disturbance or drainage, is probably now extinct in Down, but *Drosera anglica*, *V. Oxycoccus*, and *Rhynchospora alba* may yet linger in wet corners. Though I saw no trace of them, I added, on these old bogs, one plant to the Down flora, namely *Lastrea spinulosa*. A young clump was seen near the road $1\frac{1}{2}$ miles N.W. of Wolf Island, and later a colony of very fine plants, 2 to 3 feet high, at the west side of Wolf Island bog. *Carex curta* is still abundant there, with *Utricularia minor*; but the bog plant-association is gone for ever.

My notes of Ards plants have been subjected to a copious weeding-out, on comparison with *Flora of the North-east of Ireland* (1888), its *Supplement* (1895), and other published notes. The balance may be arranged as follows:—

Thalictrum dunense, Dum.—Sand-dunes opposite Green Island, and roadside bank near same place.

Ranunculus Lingua, L.—Abundant around Lough Cowey, and in marsh half-a-mile S.E. of that lake.

Papaver Rhæas, L.—Sparingly at Millin Bay, and two miles N.E. of Portaferry.

Glaucium flavum, Crantz.—Cannot now be described as “plentiful from Kearney’s Point to near Ballyhalbert” (*Fl. N.E.*). I found it occasionally from Millin Bay to Newcastle (Ards), being abundant only about Kearney and south of Quintin Castle. Several of the maritime plants appear to have diminished since Mr. Stewart explored the Ards, and others to have increased. See under *Eryngium* and *Raphanus maritimus*.

Brassica alba, Boiss.—Abundant in cultivated land at Bar Hall Bay and at Newcastle.

Crambe maritima, L.—Mr. S. A. Moore wrote me last year that the Sea-kale grew “in a small bay south of Tara Point.” In South Bay, evidently the spot indicated, I found a grand colony of this rare and decreasing species, of which I failed to find a trace in Mr. Stewart’s station a mile further north. About a dozen clumps were in grand fruit, forming grey hemispherical masses four feet across. Another dozen large clumps were without fruit or flower, and at least twenty young plants were also present.

Raphanus maritimus, Smith.—Has been recorded from Ballywalter (Davies) and Ballyhalbert (Praeger), but this gives no idea of the extraordinary profusion of this plant on the Ards coast, which is not equalled elsewhere in Ireland. It ranges from two miles north

of Ballywalter to Green Island, and for long stretches along this eleven miles of coast it forms a broad yellow fringe above high water mark. It must be an increasing species in the Ards, as it was not observed there until 1893.

Cerastium semidecandrum, L.—Cloghey Bay.

Sagina nodosa, Fenzl.—Seen only at Marlfield Bay on Strangford Lough.

Geranium columbinum, L.—On stony flat ground along the base of a loose stone wall on the N.W. edge of Lough Cowey, growing among *Ulex*, *Rubus*, *Nepeta Glechoma*, *Veronica Chamædrys*, &c. There was a good deal of the plant here over a small area, and it occurred again on the edge of a lane a few hundred yards away. No evidence of possible introduction, such as recent disturbance of the ground, presence of non-native species, &c., was to be seen, and I regard the plant as indigenous here.

Trifolium arvense, L.—In crops at Lough Cowey.

Agrimonia odorata, Mill.—Roadside at Granagh Bay near Portaferry. Grows 6ft. high among bushes on edge of Ballyfinragh Lough.

Poterium officinale, Hook. fil.—The range of this rare and local plant in its only Down station (Pastures, Donaghadee, Miss Maffett—*Flor. Belf.*, 1863) has never been worked out. One of our Belfast botanists might advantageously spend a day in doing this. Miss Maffett's station is, no doubt, that in which it has been subsequently found by Corry and by Davies—about half-a-mile south of the town. The railway to Donaghadee was constructed in 1861, and the plant appears to have then seized on the favourable habitat afforded by its slopes and fences. Mr. Davies found it on a railway bank "near Donaghadee." To me it revealed itself at once by the railway, on the west side of the bridge under the Millisle road, and I traced it westward along the line for over a quarter of a mile, growing abundantly on the railway slopes and edges of fields immediately adjoining.

Eryngium maritimum, L.—Only seen sparingly (not abundantly, as done by Mr. Stewart) in Templeton's original station below Kirkistone Castle.

Slum augustifolium, L.—Common in marshes in the southern part of the Ards.

Crithmum maritimum, L.—Only seen in Mr. S. A. Moore's station, a quarter of a mile north of Kearney village, where there is an enormous clump of it on the beach.

Ligusticum scoticum, L.—Noted by Templeton in 1793 from "about Donaghadee and the Copeland Isles," its most southern stations in Ireland, and since seen in the latter locality by Corry. I can extend its limit some twelve miles further, having found it in plenty at Butterlump rock, and again more sparingly half-a-mile north of that fine erratic.

- Valerianella Auricula**, DC.—In great abundance in several fields of wheat at Doo Lough, and again in oats at Lough Cowey.
- Senecio Jacobæa**, L., var. **flosculosus** (Jord.)—Bar Hall Bay below Portaferry.
- Campanula rotundifolia**, L.—In the whole Ards seen only at Millin Bay sparingly.
- Statice rariflora**, Drej.—Abundant on the Strangford Lough shore, but not seen anywhere on the Irish Sea shore of the Ards.
- Mertensia maritima**, S. F. Gray.—Mr. S. A. Moore wrote me last year of a colony of the Oyster-plant near Kearney. I found his station, which is at the eastern extremity of Knockinelder Bay. Here there is a fine growth of the plant, one specimen covering a circle four feet in diameter with a mass of flowers and bluish foliage.
- Solanum Dulcamara**, L.—Abundant among the reeds and Narrow-leaved Reed-mace surrounding Lough Cowey.
- Euphrasia gracilis**, Fr.—Butterlump rock.
- Scutellaria galericulata**, L.—Stony sea-beach north of Kearney, and abundant round Lough Cowey.
- Chenopodium rubrum**, L.—Not unfrequent on wet sandy shores in the northern Ards, where it grows among *Atriplices*, *Chenopodium album*, and *Juncus bufonius*. Found south of Woburn House; along a mile of shore at Ballyferis Point; and in the bay south of Ballywalter.
- Beta maritima**, L.—On the Ards coast concentrated about Portaferry, where it is abundant. Very rare elsewhere.
- Atriplex farinosa**, Dum.—Abundant on sandy shores in the Ards, from Millisle to Cloghey.
- A. portulacoides**, L.—A good colony on Green Island near Portavogie: The most northern station in Ireland.
- Ceratophyllum demersum**, L.—Grand plants, six feet in length, in pools by Lough Cowey; found also in Lough Doo, and in Ballyherly Lough.
- Hydrocharis Morsus-ranæ**, L.—Abundant around Lough Cowey, and in a marsh $\frac{1}{2}$ mile S.E. of it; also in the dam at Bishop's Mill. The one stream drains all three spots.
- Scilla verna**, L.—Abundant on the outer shore-line, and frequent on rocky knolls up the Strangford shore as far as Kircubbin.
- Juncus obtusiflorus**, Ehrh.—Found only in two marshes, one on either side of the road to Cloghey, $\frac{1}{4}$ mile N.E. of Portaferry.
- J. glaucus**, Ehrh.—Lough Cowey.
- Typha angustifolia**, L.—Lough Doo, Bishop's Mill, and in enormous abundance round Lough Cowey.
- Sparganium affine**, Schnizl.—Marsh $\frac{1}{2}$ mile S.E. of Lough Cowey.
- S. minimum**, Fr.—Bog holes at Lough Cowey, and abundant in a marsh $\frac{1}{2}$ mile to the S.E.
- Potamogeton plantagineus**, Ducr.—Very fine in pools in a marsh $\frac{1}{4}$ mile from Portaferry on left-hand side of road to Cloghey.

Eleocharis multicaulis, Sm.—Marsh east of Ardkeen.

Cladium Mariscus, R. Br.—Abundant in a marsh $\frac{1}{2}$ mile S.E. of Lough Cowey.

Carex teretluseula, Good.—Occurs plentifully with the last.

C. paniculata, L.—Marsh 2 miles N.E. of Portaferry.

C. divulsa, Good.—A number of fine plants in a hedgebank by the side of a lane which runs from the main road to the sea, past a large farm-house, between Blackstaff Bridge and Saltwater Bridge. The plant grows near the shore end of the lane, on the north side.

Agrostis alba, L., var. **maritima**, Meyer.—Roadside by the sea N.W. of Portaferry. A curious form, with long procumbent stems, and narrow tufted inflorescence.

Poa nemoralis, L., var. **coarctata** (Gaud.)—Abundant on walls at Greyabbey churchyard.

Glyceria plicata, Fr.—By the Carrstown Burn near Millin Bay.

G. festucæformis, Heynhold.—Sparingly along the stony shore of Strangford Lough from Marlfield Bay to Old Man's Head, and again north of the Blackstaff River mouth.

Bromus sterilis, L.—Portaferry.

Lastrea spinulosa, Presl.—Wolf Island bog, and $1\frac{1}{2}$ mile N.W. of same place.

In addition to the above, the following plants, which are rare or local in Down, and most of them not recorded from the Ards, were found in a number of stations, and may be set down as frequent in the district:—

Ranunculus trichophyllus.

Viola canina.

Cerastium tetrandrum.

Sagina maritima.

Ulex Gallii.

Vicia angustifolia.

Potentilla procumbens.

Rosa rubiginosa.

Myriophyllum spicatum.

Anthriscus vulgaris.

Oenanthe Lachenalii.

Valerianella dentata.

Bidens tripartita.

Utricularia vulgaris.

U. minor.

Lycopus europæus.

Lamium intermedium.

Stachys arvensis.

Polygonum Raii.

Euphorbia exigua.

Parietaria officinalis.

Salix pentandra

Potamogeton obtusifolius.

Scirpus rufus.

Carex extensa.

Catabrosa aquatica.

Koeleria cristata.

Festuca rothbœllioides.

Lepturus filiformis.

Of plants which have been recorded from the Ards, but were not seen by me, the most interesting are the bog plants which have been already referred to. Two of Templeton's records have not been verified—namely, *Erodium moschatum*, near Portaferry, 1806; and *Osmunda regalis*, Kirkiston Bog,

1793. The former is very likely there still, but as regards the latter, it has probably been destroyed by the drainage and total reclamation of the bog.

My best thanks are due to Mr. Arthur Bennett, Prof. E. Hackel, Rev. W. Moyle Rogers, and Mr. Frederick Townsend for their opinion on a few of the plants collected.

National Library, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Blue-fronted Amazon and a Californian Quail from Miss Telford, a Grass Parrakeet from Miss F. Duffy. The outdoor section of the Nesbitt Aviary has been entirely rebuilt, and will be used for the hardy kinds of Parrots. Ten pairs of Grass Parrakeets, and six pairs of Weaver-birds, lately purchased, are now on view in these open-air cages. The young Giraffes are in excellent health, and prove, as might be expected, a great attraction to visitors.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JULY 3.—ANNUAL MEETING.—The chair was occupied by John Brown, F.R.S. (President). The Hon. Secretary submitted the annual report of the Council, in which it was stated that the winter session was opened in the Museum on November 5, 1902, when the President, Mr. John Brown, F.R.S., gave an opening address, taking as his subject "The Liquefaction of Gases," illustrated by numerous experiments. Six other business meetings were held at which seven papers were read. At all these meetings the attendance of members and of the general public showed no diminution. Mainly as a result of the suggestions made by Professor Gregg Wilson in his lecture on "Recent Fishery Research" on 2nd December, the Ulster Fisheries and Biology Association, has been established. Already good work has been done, and much interest aroused for its future welfare. The natural history collections in the Museum have received a great amount of attention during the year, and the much-needed work of revision and rearrangement has to a large extent been carried out by a number of volunteer experts. The Irish fossils have been taken off the old tablets and remounted on a new system by Mr. Swanston. The important set of County Down graptolites is not yet in place, but is being renamed and classified by Professor Lapworth. The collections representing Irish vertebrate zoology have been taken in hand effectively by Mr. Robert Patterson. Seven

drawers of birds' eggs have been classified and mounted on the modern system by Messrs. Nevin H. Foster and John Cottney. Many clutches of eggs, hitherto absent or imperfectly represented, have been added, and there is now a complete series of the eggs of Irish nesting birds. The Rev. W. F. Johnson and Mr. H. Lamont Orr have done much work in supplying, arranging, classifying, and mounting the collections of native insects. There have been many valuable recent additions to the Museum collections. The specimen of Golden Eagle from County Donegal, presented by Sir James Musgrave, is noteworthy by reason of the ever-increasing scarcity of this bird in Ireland. Two cases of Salmon, pictorially mounted, presented by Mr. Robert Patterson, are also specially attractive additions.

The following members were elected to the Council of Management for the ensuing year:—Rev. Dr. Hamilton (President of Queen's College), Professor Symington, Professor Gregg Wilson, R. M. Young, J.P.; and T. F. Shillington, J.P.

The following officers of the Society for the year 1903-4 were elected at the subsequent meeting of the Council:—President—Professor J. Symington, F.R.S.; Vice-Presidents—Sir Robert Lloyd Patterson, D.L., J.P.; Wm Swanston, F.G.S.; Rev. T. Hamilton, D.D., LL.D., M.A., (President of Queen's College); and Robert Young, J.P., C.E. Hon. Treasurer—W. H. F. Patterson. Hon. Librarian—J. H. Davies. Hon. Secretary—Robert M. Young.

BELFAST NATURALISTS' FIELD CLUB.

JULY 11-14.—EXCURSION TO NORTH DONEGAL.—On July 11 forty-four members and visitors started for Rosapenna, travelling by the Northern Counties railway to Londonderry, and thence to Creeslough by the Lough Swilly railway. Here brakes were waiting to convey the party to Doe Castle, picturesquely situated on a rock projecting into an arm of Sheephaven, whence they proceeded to Rosapenna, which was reached in time for dinner. Daylight still remained for an evening walk over the sandhills and headlands. Next day (Sunday) there was no fixed programme. Many members visited the ruined churches of the district, the inscribed stones of Newgrange type, the kitchen-middens, &c. On Monday morning an interesting visit was paid to the Congested Districts Board's herring fishery station at Downing's Bay, where they were met by Mr. Duthie, the Board's instructor, who fully explained the system on which the station is worked. The afternoon was devoted to work about the lonely Bay of Tranarossan and the many kitchen-middens with the land-shell deposits there.

These are all on a great dead-level sand plain, stretching across the peninsula from Sheephaven to Mulroy, and composed very largely of comminuted marine shells—those little areas which are ponds in winter forming thin beds of calcareous sandstone by the deposition in summer of lime in solution. The old land-shell deposits are almost gone, like

those at Dog's Bay, Galway; they contain many *Vertigo angustior* and other small species. These deposits and the dune hollows are full of wind-sifted shells, chiefly *Vertigoes*. Careful sieving by very fine silk sieves revealed a quantity of jaws and leg bones of mice.

On Tuesday morning the members left Rosapenna, and drove through Mulroy demesne, and a useful hour was spent collecting at Cratlagh. Lunch was ready when the party reached Milford, after which they proceeded to Rathmullan, and crossed Lough Swilly, and a special train conveyed them to Londonderry, whence the fine dining car express of the Northern Counties Company brought them back to Belfast.

A good deal of material was collected by both zoologists and botanists which is not yet worked out. The botanists noted the abundance of *Lastrea æmula* and *Osmunda regalis*, and *Botrychium Lunaria* was found. Among other species noted were *Sedum Rhodiola* and *Lithospermum arvense*. Fifty-nine species of birds were observed, including the Tree-creeper, Dunlin (in full breeding plumage), and a colony of a hundred pairs of the Common Gull. The strands yielded good gatherings of Foraminifera, and many higher groups of invertebrates; the sand-dunes bones of many wild and domestic animals, and mollusca, in the kitchen-middens. Ray Wood yielded a good haul of land-shells, including *Limax cinereo-niger*, *Helix lamellata* and *Hyalinia excavata*. The full results obtained in some of the groups in which collecting was done will appear in the *Irish Naturalist* subsequently.

AUGUST 1.—LARNE MARINE LABORATORY.—Over fifty members and friends assembled at Larne Harbour on the arrival of the 2.15 train from Belfast. The chief object of the excursion was to give the members of the Field Club an opportunity of inspecting the work and working methods of the Ulster Fisheries and Biology Association. The party was divided into three groups: the first went for a trip up Larne Lough in the Association's steam launch 'Mysis,' under the care of W. Rankin, who was in charge of the launch for the day; the second visited the Larne gravels, under the guidance of the President (W. J. Fennell, M.R.I.A.I.); while the third went straight to the Biological Station of the Association, where the Hon. Director (Professor Gregg Wilson, D.Sc.) explained the various objects of interest arranged in the shelves in the laboratory, as well as the different nets and apparatus in use. The routine work of the place was explained, and it was mentioned that physical and meteorological observations are regularly made, in addition to those on the structure, habits, and distribution of animals. The various kinds of apparatus made use of were demonstrated; and special interest was shown in the incubator that is used in the process of embedding animals or tissues in paraffin as a preliminary to making fine sections of them with a microtome. A large number of living animals representing different groups of the animal kingdom were exhibited and described. Attention was also called to the beginning of a museum of marine zoology, and the best methods of mounting preparations in spirit and formalin were illustrated. Finally the numerous specimens already

secured by the Fisheries Association, and now stored on the shelves of the general laboratory, were examined. They include a number of species new to the district, and many that are named and available for reference, as well as not a few that are still to be identified. It was intimated that workers are still wanted to take up several groups of marine animals, and members of the Field Club were invited to co-operate with the present workers of the Fisheries Association in studying the material that is obtainable, and which would be freely placed at their disposal. About sixteen members went out in each trip of the steam launch, so that all had an opportunity of seeing the entire methods of work carried out by the Association, and the results already obtained. At six o'clock all assembled in the Olderfleet Hotel for tea, after which a short business meeting was held. A vote of thanks to Professor Wilson and Mr. Rankin was cordially passed, on the motion of the President, seconded by W. Gray. A successful excursion terminated by the majority of the members returning to Belfast by the 7.40 train.

AUGUST 22.—EXCURSION TO BENBURB.—Twenty-eight members and friends travelled by the 8.40 train to Armagh and drove from thence to Benburb, Co. Tyrone, where the celebrated castle, perched on the summit of a limestone cliff, 120 feet above the river Blackwater, was visited and examined. The limestone quarries of Benburb are rich in fossils, and the geologists of the party were soon busy. Among the fossils collected were *Productus giganteus*, *P semireticulatus*, *Fenestella antiqua*, *Lithostrotion basaltiformis*, *L. junceum*, *Cyathophyllum fungites*, with stems of *Eucrinites*, which were very abundant. Good collections were made in other departments, but nothing noteworthy observed. Twenty-two species of birds were noted. On again reaching Armagh tea was partaken of, and a business meeting held at which three new members were elected. The party returned to Belfast by the 6.34 train.

SEPTEMBER 5.—EXCURSION TO WOODBURN GLENS.—Sixty members and friends attended this, which was the last excursion on the programme. Being a "half-day," there was not much time for work. The party drove to Duncrue Fort, and visited it and the adjoining ruins of Killiaun Church, which were described by George E. Reilly. Then North Woodburn Glen was visited, and the geologists attempted some collecting, but the river was too high to allow the best sections to be reached. Tea was served in a house lent by the Water Commissioners, and then the South Glen was explored in the dusk of the evening. *Helix arbustorum* was the best shell found. The party drove back to Belfast by moonlight.

DUBLIN NATURALISTS' FIELD CLUB.

AUGUST 22.—EXCURSION TO THE MURROUGH OF WICKLOW.—Five members under the guidance of J. De W. Hinch travelled by the 10 a.m. train to Newcastle, and walked thence along the Murrough to Wicklow station. Very heavy rain prevented much natural history work being done, and after tea the 6.26 p.m. train was taken back to town.

NOTES.

BOTANY.

Scapania intermedia Hus. in Ireland.

In the *Journal of Botany* for August, Rev. H. W. Lett records this plant from sandstone rocks over Lough Muskry, in the Galtees, and mentions specimens collected in Colin Glen, Co. Antrim, by Rev. C. H. Waddell.

New Plants for West Mayo.

When on the way to Clare Island last July, an evening was spent at Westport. In the demesne *Chelidonium majus*, *Stellaria Holostea*, *Asperula odorata*, *Solanum Dulcamara*, and *Bromus asper* were noticed, and by the river a few good plants of *Barbarea arcuata*, Reichb. At the quay were *Veronica hederæfolia*, and a large luxuriant colony of *Lepidium Draba*, which is well established there. In the town *Festuca Myuros* grew on walls. *Campanula rapunculoides* occurred in an old sloping pasture at Rossbeg, which had apparently never been broken up. On the drive from Westport through Louisburgh, *Iris fetidissima* was noticed occasionally in wild ground near cultivation; and at Kilsallagh *Sempervivum tectorum*. A visit was paid to Bartraw, a curious gravel beach running from the mainland to a small island a mile distant. Here *Cakile maritima* and *Polygonum Raii* were gathered. *Equisetum maximum* grew at Leckanny and elsewhere. None of these fifteen plants are on record for W. Mayo.

R. LLOYD PRÆGER.

Dublin.

Pinguicula grandiflora in Clare.

Last June, among a small parcel of plants from Lisdoonvarna sent me for naming by Professor Ambrose Birmingham, M.D., there was a blossom which was at once recognisable as that of *Pinguicula grandiflora*. On writing to Prof. Birmingham, he kindly had further specimens collected—some of which are now being grown at Glasnevin—and called with me and described the plant and its habitat. It grows plentifully on a wet low cliff overlooking a stream, amid fields and waste land, a few hundred yards from the pumphouse at Lisdoonvarna. Before accepting such an extension of range for this most interesting plant, hitherto known only from Cork and Kerry, botanists will naturally wish to know more concerning the Lisdoonvarna station, especially in view of the fact that the plant has been successfully introduced in Co. Wexford, where it has multiplied, and now forms a flourishing colony which has all the appearance of being native. Further information than that given above I cannot at present supply, but it is well to put the find on record at once; possibly some botanist visiting Clare next May or June may investigate the matter for us.

R. LLOYD PRÆGER.

Dublin.

Another locality in District XII. for *Atriplex portulacoides*.

This, which is one of the rare maritime plants of the district, was gathered in August last amongst *A. farinosa* and *Beta maritima* at the mouth of the Shimna River, Newcastle, Co. Down.

Lenadery, Co. Down.

J. H. DAVIES.

New Plants for North-Western Counties.

Brief trips in the north-west at the end of last June and in August, though their main object was not botanical, yielded a number of plants unrecorded for their respective counties, which may be worth recording.

24. LONGFORD.—†*Brassica nigra*, railway bank at Longford. *Galeopsis versicolor*, potato field near Newtownforbes. *Bromus mollis* and *Agropyron repens*, Longford.

28. SLIGO.—*Ranunculus circinatus*, Feenagh Lough. *R. Auricomus*, Keshcorran and Lough Gill. ‡*Brassica Rapa* (v. *Briggsii*), about Ballymote. *Senebiera Coronopus*, Mullaghmore. *Hypericum humifusum*, Kesh. *Vicia angustifolia* and **Sempervivum tectorum*, near Sligo. *Cicuta virosa*, Feenagh Lough. **Matricaria discoidea*, Ballymote station; also at Ballysadare on roadsides in 1899. ‡*Anthemis Cotula* and **Tanacetum vulgare*, Drumcliff. **Mimulus guttatus*, stream at Doonally. *Veronica hederifolia*, Hazelwood. *Lycopus europæus*, Mullaghmore. *Ulmus montana*, limestone cliffs of Keshcorran, native. ‡*Salix fragilis*, Ballymote. *Empetrum nigrum*, Glencar. *Potamogeton obtusifolius*, *Carex curta*, *C. paludosa*, Feenagh Lough. *C. extensa*, Drumcliff. *Phleum pratense*, Feenagh Lough. *Glyceria maritima*, Drumcliff. *Agropyron caninum*, limestone cliffs of Keshcorran. *Equisetum maximum*, Doonally and Glencar.

29. LEITRIM.—*Brassica alba* and **Trifolium hybridum*, along the coast. *Lathyrus macrorrhizus*, Glencar. ‡*Smyrniolum Olusatrum* and **Tanacetum vulgare*, along the coast. *Salix repens* and *Botrychium Lunaria*, Glencar.

32. MONAGHAN.—*Anthyllis Vulneraria*, Inishkeen.

33. FERMANAGH.—*Brassica alba* and **Petasites fragrans*, Belleek. *Origanum vulgare*, banks at Newtownbutler.

In addition, second stations were found for a number of species whose inclusion in the respective county-floras rested on one record only.

Two additional notes are worth quoting:—*Orchis mascula*—summit of Keshcorran, 1,163 feet. *Linaria Cymbalaria*—grows on small rocky islets on Lough Gill, such as Goat's Island, amid a purely native vegetation.

Dublin.

R. LLOYD PRAEGER.

Calcifuge Plants on Limestone.

Last June, in Co. Sligo, I noted a strongly calcifuge flora, including *Hypericum humifusum*, *Cytisus scoparius* (abundant), *Galium saxatile*, *Digitalis purpurea*, *Blechnum Spicant*, and *Athyrium Filix-femina*, growing on the drumlins which lie along the south base of Keshcorran. These drumlins rest on the limestone, and are apparently composed of the debris of the limestone. No other rock occurs within several miles.

Dublin.

R. LLOYD PRAEGER.

Some Plants near Banbridge, Co. Down.

Spergularia rubra, Pers., which I mentioned before as occurring about Banbridge, is much more abundant and widespread in the valley of the Bann than then appeared. It grows, chiefly along the railway, from a point above Banbridge as far as Laurencetown, and perhaps will be found to extend even further in both directions.

Cicuta virosa, Linn.—In Drumaran Lough, Tullylish, also in Drumnavaddy Lough.

Galium Mollugo, Linn.—An introduced plant at Lenaderg. In the absence of support, save that afforded by Ox-eye Daisies, its stems attain a length of four to five feet and more.

Dipsacus sylvestris, Huds.—Sparingly on waste ground by the River Bann at Lenaderg. Probably only a casual here, though it cannot be ascertained that it is ever cultivated in any of the neighbouring gardens.

Leontodon hirtus, Linn.—Very plentiful on ground before my house at Lenaderg, not here a plant and there another, but growing in large, close patches over an area of fully half an acre.

Plantago media, Linn.—Another plant at Lenaderg, some time introduced, it is to be supposed, with grass-seed. It occurs in several places in the same enclosed ground, where it is evidently increasing in quantity, and might do so still more, were it not that its young, tender scapes are frequently nibbled off by vagrant rabbits.

Poa nemoralis, Linn.—In astonishing profusion in woods and thickets at Lenaderg, and also in my orchard at that place.

Ceterach officinarum, Willd.—Very luxuriant, with unusually long, drooping fronds, on a wall at Corbet Lough.

J. H. DAVIES.

Lenaderg, Co. Down.

Blitum capitatum, in Co. Fermanagh.

This queer Chenopod (*Blitum capitatum*, L.) widely spread as an alien of cultivated land over Europe from Norway to France and Austria, I found growing in a cultivated plot at Farnaght, about 4 miles south-east of Enniskillen. It has been known to persist in this station for over a century. It occupies a very limited area, and has never spread to any great distance from its original abode; stray plants have been found in adjoining fields, but disappeared in a year or two. The mature plant is very striking in appearance, its average height being 10 to 16 inches, the fruit resembling field strawberries in colour and appearance, but much larger; they are very succulent and were once used, it is said, by cooks for colouring puddings. It is also a great favourite with fowl. As it is widely distributed over the Continent may it not have been a native of Britain in the past, or perhaps cultivated for domestic purposes?

N. CARROTHERS.

Belfast.

Luzula albida var. *rubella* in Ireland.

This graceful *Luzula*, I think, has not heretofore been observed in Ireland. Being an interesting and a welcome stranger a note of its occurrence here may not be out of place.

It has been met with in two places, not far apart, at the border of an enclosed plantation near the west side at Lenaderg, County Down. The plant is in fair quantity, but not more than about a dozen flowering stems were observed, and as these were gathered early in July it cannot yet be stated whether it matures its seed. By what agency, when and where the plant came here is a problem one need hardly, at present, attempt to solve. I know of nothing to suggest intentional introduction. It seems to have fixed itself, and to be as much in place as the grasses (chiefly *Deschampsia cespitosa*) amongst which it grows. The variety seems to differ from the type mainly in the colour of the inflorescence, which has a fuscous hue, and in the long, soft pilose leaves being rather narrower.

In the list of excluded species at the end of Hooker's *Student's Flora*, 1884, *Luzula albida* is mentioned as "a casual in Surrey." Specimens from that county, which, through the kindness of Mr. S. A. Stewart, I have had the opportunity of examining, were gathered in 1893 by Major Wolley-Dod, so that it may be held to be established there. In 1883 the var. *rubella*, identical with the present plant, was collected in two places in Worcestershire by Mr. Arnold Lees. There it is abundant. On the label attached to the examples I have seen Mr. Lees writes:—"In profusion for two miles along the sandy and rocky banks of the Bewdley branch railway, and sparingly in Warren Wood—May and June, 1883." My old friend William Foggitt informs me that his first record for Yorkshire is July, 1886, and that he had seen it growing there several years later. Mr. Druce records the variety *rubella* in his *Flora of Berkshire* under the name of *Juncoides nemorosum* Morong.

The species is widely diffused in Continental Europe. In England it seems to have been first noticed about a quarter of a century ago, and its distribution there, so far as I know it, is here given to show that it has no slight claim to the position of a naturalized alien. It is not improbable that, in course of time, it may gain a like foothold in Ireland.

J. H. DAVIES.

Lenaderg, Co. Down.

Arabis ciliata.

To the *Journal of Botany* for August Mr. F. Townsend contributes what is practically a translation of a paper on this critical plant by M. Georges Rouy in the *Revue de Botanique Systematique* for May, the basis of the paper being specimens collected on sand-hills in South Kerry by Rev. E. S. Marshall in June, 1902. The writer first points out that confusion has arisen between the rare *A. ciliata*, R. Br., a plant confined to the coast of western (in error eastern is printed) Ireland and of Pembrokeshire, and *A. ciliata*, Koch=*A. arcuata*, Shuttleworth, an alpin

plant of fairly wide range in Central Europe. He then fully describes *A. ciliata*, R. Br., and discusses its affinities, which are with *A. hirsuta* Scop., and especially with that form of it which is known as *A. Retziana*, Beurl, var. *curtisiliqua*, Rouy and Foucaud; this form is found on the seaboard of Great Britain, Sweden, and Norway.

ZOOLOGY.

Irish Marine Annelids.

Prof. W. C. M'Intosh of St. Andrews, in the *Ann. and Mag. Nat. Hist.*, vol. xi, 7th s., 1903, continued his interesting revision of the British Annelids under the title of "Notes from the Gatty Marine Laboratory." The species of *Onuphis* and their allies are particularly referred to in this article. The Irish forms mentioned are *Onuphis fragosa* var., *Hyalinacia tubicola* and *H. sicula*, *Eunice vittata* and *E. philocorallia*. The latter species, which was first described by Miss Buchanan in *Sci. Proc. R. Dublin Society*, 1893, from the deep water off the west coast of Ireland, has since turned up in Norwegian waters. Then Prof. M'Intosh also refers to *Lumbriconereis hibernica*, *L. gracilis* and *Arabella iricolor*, all of which are Irish species.

Entomostraca observed at Lough Gur.

The following species of Cladocera have been identified by me in a gathering along the shores of L. Gur, in addition to those already recorded in the account of the joint excursion of the Dublin and Limerick Field Clubs (*supra*, p. 209):—*Simocephalus vetulus*, O. F. Müll., abundant; *Ceriodaphnia quadrangula*, O. F. Müll., abundant; *Bosmina longirostris*, O. F. Müll., a few corresponding to Plate xxxi., fig. 7, Lilljeborg's *Clad. Sueciæ*; *Alona costata*, Sars.; *Chydorus sphaericus*, Müll., abundant.

WM. FRAS. DE VISMES KANE.

Drumreask, Monaghan.

A rare blind Amphipod from Lough Mask.

In a gathering, dredged lately from the deepest part of Lough Mask, I noticed a very small orange-coloured *Niphargus*, which I sent to Canon Norman, F.R.S., for identification. He writes to me:—"You have made a most interesting discovery. *Niphargus* and the very closely allied genera are inhabitants of wells and caves in Europe, America, Africa, and Australia. The last valuable additions to my collection of Amphipoda I received (except one species I found at the Scilly Islands in May) were five species most kindly sent to me from the wells and caves of France and Algeria by M. Chevreux, the well-known French authority on Amphipoda. Besides the well and cave species, only two have been

described from lakes—one described about forty years ago from the Lake of Geneva ; the other lately sent me by the describer, Prof. G. O. Sars, from the Caspian. Now your L. Mask species comes very near, if it be not the same, as the Genevan species. I have only as yet roughly examined it, but all its organs must be compared. Such of your specimens as have the last uropods are females. A great point of interest is that this lake-dwelling species is blind, just as is the case with the well-dwelling ones." The readers of the *Irish Naturalist* will remember that in 1901 (vol. x., p. 91) a notice appeared noting the existence of one of these crustacea in the wells of Dublin. I send this preliminary notice of this Amphipod from L. Mask, as it proves how much of interest still awaits research into our Irish fauna.

WM. FRAS. DE V. KANE.

Drumreaske, Monaghan.

Irish and British Woodlice.

In a "Supplemental List of British Land Isopoda" (*Ann. and Mag. Nat. Hist.*, vol. xi. (7th s.), 1903, Canon Norman refers to the fact that *Trichoniscus vividus* had now been recorded from another Irish locality—viz., Cappagh, Co. Waterford—though it has not yet been found in Great Britain.

Mr. de V. Kane's note of the occurrence in Co. Clare of *Haplophthalmus Mengii* (*Irish Naturalist*, ix., p. 246) is now confirmed by Canon Norman, and he also notes that a new *Porcellio*—viz., *P. Ratzeburgi*—has been taken in England since his original paper on the British Land Isopoda was published.

Three New Irish Beetles from Co. Dublin.

In the *Entom. Mo. Mag.* for the current year (2), vol. xiv., p. 40, Mr. Stanley W. Kemp records the capture of three beetles in Co. Dublin, that are additions to the Irish list. They are *Hydroporus longicornis*, Sharp, from Kippure (2,200 feet elevation) ; *Phytosus nigridentris*, Cher., from Baldoyle ; and *Omalium rugulipenne*, Rye, which occurs commonly along the north Dublin shore at the North Bull, Baldoyle, and Sutton.

Silpha subrotundata.—Species or Variety ?

A short article, by the Rev. W. F. Johnson, in the same volume of the *Entom. Mo. Mag.* (pp. 99-100), supports the view that this interesting Irish beetle should be regarded as a distinct species, and not as a mere variety of *S. atrata*. It is noteworthy that in the Isle of Man, as in this country, the latter form is replaced by *S. rotundata*.

A New Irish Caddis-fly.

Also in the same volume of the *Entom. Mo. Mag.*, Mr. R. M'Lachlan records a number of Trichoptera, Neuroptera Ephemera, and Psocidæ collected by Rev. A. E. Eaton in the south-west of Ireland. Among the Trichoptera the species *Adicella reducta*, M.L., from Killarney, is not recorded in Mr. King's Irish List.

Varieties of *Melitæa aurinia*.

In an interesting paper (*Entomologist*, vol. xxxvi., 1903, pp. 86-9, 108-112) Mr. Percy E. Freke comments on the named varieties of the "Greasy Fritillary," comparing the forms of the species found in Ireland with those characteristic of Great Britain.

Nisoniades tages in Co. Mayo.

I noticed this butterfly lately at Colonel Knox's, Creagh, near Ballinrobe.

WM. FRAS. DE VISMES KANE.

Drumreask, Monaghan.

Breeding of Wigeon in Ireland — A correction.

In the *Irish Naturalist* of July, 1901, page 147, I published a note recording the taking of eggs by Mr. Cottney near Belfast, which Mr. Ussher and I pronounced to be Wigeon's. It now appears that we were wrong, and the record must be cancelled. The investigation into this question has brought to light a most important point, hitherto unknown to me, viz. :—that it is not sufficient to rely upon the down found in a duck's nest; the *small feathers* are far more important as a guide to identification. For instance, there is little difference between the down of some Shovelers and the down of some Wigeon, but there is always a difference in the small feathers found among the down. In the Wigeon these small feathers are *pure white* with light grey bases; in the Shoveler they are *pale buff* with dark brown centres. This has been pointed out to us by Mr. Heatly Noble, who has made a special study of ducks' eggs and down, and who has gone to great trouble to put us right in this matter. To show how unreliable the down alone may be, Mr. Noble points out that the appearance of the down varies according to the length of time the eggs have been sat on. If the down has been sat on any length of time it does not look nearly so bright, and the microscope shows that the little barbs have become blunted and quite changed in character. I have now no hesitation in saying that the eggs and down taken in Antrim and supposed to be Wigeon's are those of Shoveler, and the Wigeon has not yet been proved to breed in Ireland. Although it is not pleasant to have to admit that a mistake has been made, I do not regret it, as it has been the means of getting the above valuable information from Mr. Noble, to whom my thanks are due.

ROBERT PATTERSON,

Belfast,

Mistle Thrush building on the ground.

In the August number of the *Zoologist* Mr. G. H. Pentland mentions a Mistle Thrush's nest built in a tuft of bent-grass at the mouth of the Boyne.

GEOLOGY.

Coastal Drift of Pebbles.

At Achill Sound, on July 16, on a calm day, with a nearly full tide, I was struck with the way pebbles were drifting by attached to the seaweed *Chorda filum*. The hot sun had partially dried the weed at ebb, and as the tide rose the long stems rose with it. The lowest couple of feet hung down into the water, each weighted with a pebble, the remainder of the stem floating on the surface. These pebbles were up to one pound in weight, and they were drifting southward to the number of about one per minute, at a speed of about two miles per hour. The frequent occurrence of such a phenomenon would go far to explain the accumulation of gravel at certain points, as well as the distribution of small erratics of local rock.

R. LLOYD PRAEGER

Dublin.

NEWS GLEANINGS.

The Belfast Club's Excursions.

The excursions of the B. N. F. C. for the season just closed were among the most successful on record in point of attendance of members, which works out as an average of 50 for each of the seven excursions. The published programme was carried out to the letter, and the President and both Secretaries attended every excursion—which could not have been said of recent years. Thirty new members have been elected since May, and with the opening of the new Club-room in the Museum a brisk winter's work is being looked forward to by the many active members.

The Larne Laboratory.

During the second week in August, Professor G. S. Brady, M.D., F.R.S., paid a visit to the Laboratory of the Ulster Fisheries and Biology Association at Larne Harbour, and spent several days dredging and shore-collecting there. Prof. Brady expressed himself as greatly pleased with all the arrangements in Larne, and anticipates good results from the work of the Association. Several good finds have been made already; but it is thought advisable not to publish these results in haste. The work is steadily and systematically going on.

THE FLORA OF CLARE ISLAND.

BY R. LLOYD PRAEGER, B.A., M.R.I.A.

CLARE ISLAND appears to be the only one of the larger islands lying off the Irish coast, the flora of which has not hitherto been systematically examined. Tory, Rathlin, Lambay, the Saltees, Blaskets, Aran Islands, Inishbofin, and Inishturk, the Donegal Aran, have all been the subject of botanical reports or papers; Achill has been visited by many botanists; but of the flora of Clare Island, save for a couple of stray notes in *Cybele Hibernica* by Miss Emily Lawless, the records are silent. I have long been curious about the natural productions—to use a quaint old term—of Clare Island, and especially of the noble peak on its north-western side, over 1,500 feet in height, which drops sheer into the ocean in one grand precipice. Last July I had an opportunity of satisfying my curiosity. My wife and I spent a week on the island, studied its vegetation pretty thoroughly, and did some desultory zoological collecting. In view of the peculiar interest attaching to the flora of insular areas, especially of those lying off the western coast of Ireland, I have treated the subject of the present paper in greater detail than is usual in botanical contributions to the *Irish Naturalist*.

Clare Island lies across the entrance of Clew Bay; and while distant some 15 miles from the land at Westport and Newport, only three miles of sea separate it from Emlagh Point, which forms the southern entrance of the bay, and the same from Achillbeg and the Curraun Peninsula, which form the northern entrance; but these channels are deep and open, and in the full swing of the Atlantic roll. Inishturk lies 9 miles to the south-west, with Inishbofin beyond: Achill, as already mentioned, a few miles to the north. The island is roughly triangular in outline, measuring about 4 miles by $2\frac{1}{2}$ miles. Its area is $6\frac{1}{8}$ square miles, of which about one-third is under tillage or pasture, the remainder consisting of stony heath, thin bog, or maritime sward. The dominating feature of the island is the great east and west ridge (Croaghmore), attaining an elevation of 1,520 feet, which occupies much of the northern

shore. A second ridgy hill (Knocknaveen), attaining 729 feet, forms a prominent feature in the centre of the island, while a third parallel one, much lower but still conspicuous, extends along the south-eastern edge. All these ridges, as well as the high cliffs which form the extreme north, and on which the lighthouse stands, show clearly in the subjoined sketch made from the train near Mallaranny, ten miles to the north-east.

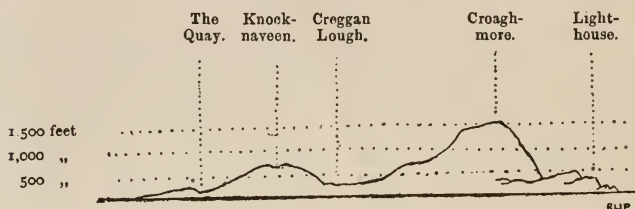


Fig. 1.—Outline of Clare Island, from the north-east.

The ground falls in all parts from the north and west towards the south and east, thus protecting the surface to a limited extent from the fury of Atlantic gales. The cultivated and inhabited portion of the island—it harbours some seventy families—lies along the eastern and southern margins. The following sketch-map shows roughly the reclaimed area, which seldom extends above 200 feet elevation, and the 500 and 1,000 foot contours. Much of the land formerly cropped has been allowed to relapse into poor pasture. Every part not under cultivation, including the hill-tops and sea-cliffs, is closely grazed by sheep, cattle, horses, and donkeys. The live-stock, which is the pride of the islanders, is certainly pretty severe upon the vegetation.

Clare Island is formed of Ordovician and Silurian slates, grits and conglomerates, dipping south at high angles, with some mica schist, and a little serpentine; a few dykes of dolerite and felstone occur. At the eastern end, Lower Carboniferous sandstone occupies a small area, resting in almost horizontal beds on the older series. The main ridges of the island follow the strike of the slates; in the south-west the almost vertical bedding produces some remarkable cliff scenery. The lower parts of the island—*i.e.* the east and south—are covered with drift. In the north-east the drift is thick, and forms steep sea-slopes over a hundred feet in height.

While producing a fairly fertile soil in some areas, in others the drift is exceedingly stony and barren. The deepest soil is found in one or two small valleys in the east. Thin boggy soil covers the greater part of the island, but no great depth of peat is now found, except perhaps on the top of Croaghmore. A single small area of blown sand occurs behind the bay at the Quay. This is the only sandy shore on the island. A few boulder beaches occur, but the coast is almost everywhere rocky, and generally cliff-bound. While along the southern and eastern sides the cliffs are generally under 100 feet in height, elsewhere they are higher, and along the north-western side of the island attain magnificent proportions.



Fig. 2.—Sketch-map of Clare Island.

Unshaded area = farm land. Dotted = unreclaimed land up to 500 feet. Hatched = do. 500 to 1,000 feet. Cross-hatched = do. 1,000 to 1,520 feet. Scale, $\frac{1}{2}$ inch = 1 mile.

The impression, as regards the vegetation, left by one's first view of the island, is its wind-swept and stunted character. No groves of trees meet the eye, no hedges even. Beyond the narrow limits of the cultivated ground, poor stony heath forms the prevalent feature, passing into bog-land as one ascends.

CULTIVATED AREA.—The approximate limits of the cultivated land are seen on the sketch-map. They are fixed partly by questions of exposure (that is, exposure to the west), and of elevation, partly by the nature of the soil, which often down to sea-level consists of a stony drift with a thin skin of peat, hopeless even as pasture. The usual crops are potatoes and oats, with some barley, rye, turnips, mangolds, and cabbages. The

damper and more sheltered meadows yield hay of fair quality. The weed flora is very poor. Among the cereals *Brassica campestris* is the most conspicuous and abundant colonist; *B. alba* is the next commonest *Brassica*; *B. Sinapis* is a rather bad third. Other prevailing crop weeds are *Spergula arvensis*, *Polygonum Persicaria*, *P. Hydropiper*, and *Euphorbia Helioscopia*. Poppies are absent; Fumatories very rare. The human activity of the island centres about the Quay, in the extreme south-east, and the chapel, on the southern shore a couple of miles away. Around these spots are grouped such species as *Sisymbrium officinale*, *Trifolium dubium*, *Matricaria discoidea*, *Calystegia sepium*, *Veronica polita*, *V. agrestis*, *V. Tournefortii*, *Lamium hybridum*, *L. intermedium*, *Stachys arvensis*, *Polygonum Convolvulus*, *Lemna minor*, all of which must on Clare Island rank as colonists, or less. Trees have only very sparingly been introduced to give shelter about the houses. Elder is that most frequently employed, and a few stunted Sycamore, Poplar, and Ash may be noted. Remnants of attempted hedges of *Cratægus* and *Hippophae* occur near the Quay; and bushes of *Salix viminalis*, *S. Smithiana*, *Fuchsia*, and *Ligustrum* may be seen. There is not a tree or bush on the island, native or cultivated, over twelve feet in height.

THE MARITIME FLORA.—The maritime flora is poor, as is usual in the West of Ireland. The only sandy bay on the island is that adjoining the Quay, and here *Arenaria peploides*, *Salsola Kali*, *Polygonum Raii*, and *Agropyron junceum* have their only station. On the sea-cliffs *Spergularia rupicola*, *Crithmum maritimum*, and *Beta maritima* are widely spread; *Eupatorium cannabinum* also was found only on sea-cliffs; *Angelica sylvestris* affected the same habitat in quantity. The salt-marsh flora is likewise meagre:—*Scirpus maritimus*, *Juncus Gerardi*, and *J. obtusiflorus* were seen only at the brackish pool (the only one on the island) at Kinnacorra; *Triglochin maritimum* only near the Quay; *Spergularia salina* was found in the Lighthouse yard, 350 feet above the sea. The wide distribution of certain other maritime species is worthy of note: *Plantago maritima* and *P. Coronopus* grow on stony ground all over the island, ascending to 1,200 feet on the Croaghmore cliffs. *Glaux maritima* occupied in abundance wet gravelly ground facing south, 300 feet elevation, and cut off by higher ground

from the sea, which was a quarter of a mile off; and occurred in similar ground in the extreme west, ascending the stony courses of streamlets to an elevation of 400 feet. *Asplenium marinum* grew abundantly on a low inland cliff near Ballytoohy, half a mile from the sea on either hand. *Spergularia rupestris* grew on the old abbey walls; *Crithmum* and *Carex distans* were seen on a dry cliff at the west end, a quarter of a mile from the nearest sea. On the Croaghmore cliffs, while *Silene maritima* ascended to 800 feet, it was noted that *Armeria maritima* and *Asplenium marinum* stopped at 400 feet, and *Cochlearia officinalis* much lower than that. The best marked association of halophile tendencies was that which formed the exceedingly short springy turf along the top of the low cliffs, and of which *Plantago maritima* and *P. Coronopus* were the dominating plants. The composition of this association is shown by the following example:—

PLANTAGO MARITIMA, v.c.	Bellis perennis.
CORONOPUS, v.c.	Hieracium Pilosella.
lanceolata, c.	Hypochæris radicata.
Thymus Serpyllum, c.	Calluna vulgaris.
Euphrasia officinalis, c.	Anagallis tenella.
Viola Riviniana.	Erythræa Centaureum.
Polygala depressa.	Prunella vulgaris.
Cerastium tetrandrum.	Carex glauca.
triviale.	flava.
Sagina procumbens.	Aira præcox.
Radiola linoides.	Holcus lanatus.
Lotus corniculatus.	Cynosurus cristatus.
Trifolium repens.	Koeleria cristata.
Potentilla Tormentilla.	Triodia decumbens.
Hydrocotyle vulgaris.	Festuca ovina.
Scabiosa Succisa.	Ophioglossum vulgatum.

This association formed a dense sward about half an inch in height, with flower-stems rising to about two inches. *Radiola*, which proved a frequent ingredient of this formation, grew $\frac{1}{2}$ -inch high, and usually unbranched; *Ophioglossum* the same height, and barren. The flowers of the majority of the plants grew level with those of *Anagallis tenella* and *Radiola*.

THE MEADOWLAND FLORA.—In this I include the lowland flora, such as is associated with a predominance of grasses, and such plants as Meadow-sweet, Purple Loosestrife, and Willows. The woodland flora—that is, its extremely meagre

representative—belongs to the same category. This flora is confined to the cultivated area, and only here and there has it wholly escaped the effects of tillage. It is best seen in the north-east of the island, where a series of little east-and-west valleys harbours a comparatively luxuriant vegetation. Here there is even an attempt at natural wood—a low scrub of *Corylus*, *Salix cinerea*, *S. aurita*, *Betula pubescens*, *Ilex*, and *Pyrus Aucuparia*, five to ten feet in height, and sheltering a growth of *Conopodium denudatum*, *Sanicula europæa*, and *Scilla nutans*. But the majority of the limited woodland plants, as will be mentioned later, find a refuge by mountain rivulets and on cliffs. In these favoured little valleys grasses and herbaceous plants grow several feet in height, and one may see clay fences covered with grand hedges of *Osmunda* growing five feet high. In the meadowland the most conspicuous plant is *Lythrum Salicaria*; and *Equisetum maximum* is unusually abundant, extending also to exposed ground, where it attains a height of only a few inches. *Cnicus pratensis*, also remarkably abundant over the island, reaches its maximum in the meadowland, where it frequently bears branched stems with several (2 to 8) heads of flowers. *Vicia Cracca* here and there forms large tangled beds of greyish foliage and blue blossoms. Brambles are common along banks and walls in this zone, but, though embracing interesting species, are apparently in no great variety—see the notes later on.

THE MOORLAND FLORA.—Beyond the limit of cultivation—which on Clare Island is usually not higher than 200 feet—the moorland area extends, in its various forms of dry banks, stony heath, marsh, bog, rock, and cliff. On the higher ground (1,000—1,500 feet) the peat-forming association is better developed, and the summit of Croaghmore consists partly of heathy and partly of spongy bog. On dry banks, *Sedum anglicum*, *Jasione montana*, and *Thymus Serpyllum* are abundant and showy. Everywhere the three common heaths (*Calluna vulgaris*, *Erica Tetralix*, *E. cinerea*) are to be met with, up to the summit of Croaghmore (1,520 feet). None of the western heaths (*Dabeocia polifolia*, *Erica mediterranea*, *E. Mackaii*) rewarded a constant search. *Ulex europæus* is confined to the east of the island, where there is plenty of it: *Prunus spinosa* likewise, but in much smaller quantity. Where the ground

gets steep or rocky, and some shelter is obtainable, *Saxifraga umbrosa*, *Lastrea æmula*, and *Salix repens* at once appear, and all three ascend to the top of the Croaghmore cliffs (say 1,300 feet). Clifly places, and the rocky banks of mountain streamlets, supply a habitat for a few stunted Oak and Ash, Rowan, Holly, and Birch; and nooks in the same places afford the only refuge of some woodland and lowland species, such as *Anemone nemorosa*, *Geum rivale*, *Fragaria vesca*, *Potentilla Fragariastrum*, *Ajuga reptans*, *Orchis mascula* (to 1,200 feet), *Carex sylvatica*, *Aspidium angulare*. Where the heathy ground gets wet, *Hypericum elodes* and *Eleocharis multicaulis* appear in quantity, and bring with them abundance of *Viola palustris*, *Drosera rotundifolia*, *Potentilla palustris*, *Hydrocotyle vulgaris*, *Menyanthes trifoliata*, and *Myosotis repens*. The characteristic Irish lowland bog flora, with *Drosera anglica*, *Rhynchospora alba*, *Andromeda Polifolia*, is absent as such, on account of absence of suitable habitat; but the two first-named plants occur, the former in two stations, the principal one being a floating morass around Lough Leinapollbauty, with *Carex limosa*; the second sparingly in a patch of wet bog near Lough Avullin. The boggy marshes form a connecting link with the pools and bog-holes, which yield *Utricularia minor* and various forms of *Juncus supinus*, *Littorella lacustris*, and several *Characeæ*. The lakelets of the island are extremely few. Lough Avullin lies in a sheltered hollow, 75 feet above O.S. datum, and is actually fringed with a tall growth of *Phragmites* and *Scirpus lacustris*; elsewhere these two species appear as starved and usually barren plants a couple of feet in height. *Nuphar luteum* grows only here. Three little loughs lie in the hollow between Croaghmore and Knocknaveen at 350 feet elevation—Creggan Lough, L. Leinapollbauty, and L. Merrignagh. They are bleak and exposed. The third yields *Nymphaea alba*, and the dredge revealed *Nitella translucens* in the first and second. Finally, there is a series of pools on the cliff near the Lighthouse, which form the only habitat of *Utricularia intermedia*, and where *Carex paniculata* may be seen growing one foot high.

THE MOUNTAIN FLORA.—Finally, reference must be made of the flora of the noble ridge of Croaghmore, 1,520 feet high, which landward shows a steep heathery slope, and on the seaward face drops sheer down into the Atlantic in one pre-

cipitous scarp. This great cliff is inconvenient to examine, because of the shattered and crumbling nature of the slates of which it is composed ; but by dint of patience I explored it from the summit to within reach of the waves, in spite of heavy rain, and the accompanying difficulties of foot-hold. The cliff proved unexpectedly interesting, on account of the alpine nature of its vegetation. Foremost among its plants is *Silene acaulis*, which is extremely abundant, forming large cushions all over the cliff from summit almost to base. As previously known, this plant was in Ireland confined to the Ben Bulbin range in Sligo and Leitrim, with small outliers on Dunaff Head in Donegal, and Benevenagh in Derry ; so that the Clare Island station is a considerable southward extension of range. It grows from 1,300 feet down to 400 feet, which is lower than previously noticed even in Donegal (550 feet.) *Oxyria reniformis*, which is also abundant, ranges here from 1,300 down to 600 feet. *Saxifraga decipiens* and *Sedum Rhodiola* range from 1,300 down to 200 feet, where they overlap the maritime flora. *Saussurea alpina* occurs in some quantity, and *Saxifraga oppositifolia*, *Hieracium hypochæroides*, and *Asplenium viride* sparingly, between 1,300 and 1,100 feet. This great cliff is also the only station on the island for *Anemone nemorosa*, *Rubus saxatilis*, *Geum rivale*, and *Hymenophyllum unilaterale* (all about 1,200 feet), and for *Polygala vulgaris* and *Campanula rotundifolia*, which are abundant there. *Sedum Rhodiola*, it should be added, is abundant along the cliffs on the north and west of the island, from beyond the Lighthouse (with *Hieracium anglicum*), to the Signal Tower. The landward face of Croaghmore is in possession of the ordinary *Calluna* association ; the only mountain plant which it yielded was *Listera cordata*. The summit (1,520 feet) is covered with bog, which consists of drier and wetter patches. In the drier parts *Calluna*, 3 to 9 inches high, dominates the association ; it is accompanied by—

Polygala depressa,
Potentilla Tormentilla.
Galium saxatile.
Solidago Virgaurea.
Erica cinerea.
Tetralix.
Vaccinium Myrtillus.
Rumex Acetosa.
Empetrum nigrum.

Juncus squarrosus.
Luzula maxima.
Scirpus cæspitosus.
Eriophorum angustifolium.
Carex pilulifera.
binervis.
Anthoxanthum odoratum.
Festuca ovina.
Sphagnum spp.

The wet association is dominated by *Sphagnum* and *Scirpus cæspitosus*, and contains also—

Potentilla Tormentilla.	Euphrasia officinalis.
Drosera rotundifolia.	Empetrum nigrum.
Calluna (very starved).	Narthecium ossifragum.
Pinguicula vulgaris.	Eriophorum angustifolium.

Several of the above-named plants range high for such an extremely exposed summit. As regards the upper limits of lowland plants, only a few observations were made, but considering how the great exposure depresses the range of the vegetation, the following may be worth mentioning:—

Angelica sylvestris,	.	.	1,200 feet.
Cnicus pratensis, ¹	.	.	1,000 „
C. arvensis,	.	.	„ „
Salix cinerea,	.	.	„ „
Scirpus fluitans,	.	.	„ „
Carex paniculata,	.	.	600 „

LIST OF THE FLORA.—In enumerating the flora of Clare Island, I shall adopt the method most saving of space—to list the plants in columns, with no further comment than the figure or letter which follows each. The figures 1, 2, 3, are used when the species were seen in only one, two, or three stations on the island; *r.* signifies rare; *f.* frequent; *c.* common; *v.c.* very common; *l.* local. For convenience of statistics, only species and sub-species (according to the standard used in *Irish Top. Bot.*) are included in this list, varieties being separately dealt with below.

Anemone nemorosa, 1.	† Sisymbrium officinale, 2.	Lychnis Flos-cuculi, <i>f.</i>
Ranunculus hederaceus, <i>c.</i>	Brassica campestris, <i>c.</i>	Cerastium tetrandrum, <i>f.</i>
Flammula, <i>c.</i>	Sinapis, <i>f.</i>	glomeratum, <i>f.</i>
repens, <i>c.</i>	alba, <i>c.</i>	triviale, <i>f.</i>
acris, <i>r.</i>	Capsella Bursa-pastoris, <i>f.</i>	Stellaria media, <i>f.</i>
Ficaria, 3.		graminea, <i>f.</i>
Nuphar luteum, 1.	Senebiera Coronopus, <i>c.</i>	uliginosa, <i>f.</i>
Nymphæa alba, 1.	Raphanus Raphanistrum, 3.	Arenaria peploides, 1.
Fumaria confusa, 2.		Sagina maritima, <i>f.</i>
Nasturtium officinale, <i>f.</i>	Viola palustris, <i>c.</i>	procumbens, <i>c.</i>
Cardamine pratensis, <i>f.</i>	Riviniana, <i>c.</i>	Spergula arvensis, <i>v.c.</i>
hirsuta, <i>f.</i>	Polygala vulgaris, 1.	salina, 1.
flexuosa, 1.	serpyllacea, <i>f.</i>	rupestris, <i>c.</i>
Cochlearia officinalis, <i>c.</i>	Silene maritima, <i>c.</i>	Montia fontana, <i>c.</i>
danica, 2.	acaulis, 1.	Hypericum Androsæmum, 3.

- Hypericum tetrapetrum, f.*
humifusum, 3.
pulchrum, f.
elodes, v.c.
Radiola linoides, f.
Linum catharticum, f.
Geranium molle, f.
dissectum, 2.
Robertianum, f.
Oxalis Acetosella, f.
Ilex Aquifolium, r.
Ulex europæus, l.
Trifolium pratense, f.
repens, c.
† dubium, 2.
Anthyllis Vulneraria, f.
Lotus corniculatus, c.
uliginosus, 1.
Vicia Cracca, c.
sepium, f.
Lathyrus pratensis, f.
macrorrhizus, 3.
Prunus spinosa, l.
Spiræa Ulmaria, f.
Rubus plicatus, f.
pulcherrimus, f.
rusticanus, f.
iricus, f.
saxatilis, 1.
Geum rivale, 1.
Fragaria vesca, 1.
Potentilla Fragariastrum, 1.
Tormentilla, c.
procumbens, 2.
Anserina, c.
palustris, c.
Alchemilla arvensis, r.
vulgaris, r.
Rosa spinosissima, r.
canina, 1.
Pyrus Aucuparia, 2.
Saxifraga oppositifolia, 1.
umbrosa, c.
decipiens, 1.
- Chrysosplenium oppositifolium 2.*
Cotyledon Umbilicus, 1.
Sedum Rhodiola, l.
anglicum, c.
Drosera rotundifolia, c.
anglica, 2.
Myriophyllum alterniflorum, 1.
Callitriche stagnalis, f.
pedunculata, 2.
Peplis Portula, f.
Lythrum Salicaria, c.
Epilobium parviflorum, f.
obscurum, f.
montanum, f.
palustre, f.
Circæa lutetiana, 1.
Hydrocotyle vulgaris, c.
Sanicula europæa, 2.
Conium maculatum, r.
Apium nodiflorum, 3.
inundatum, 2.
Conopodium denudatum, 3.
Crithmum maritimum, f.
Cœnanthe crocata, c.
Angelica sylvestris, c.
Heracleum Sphondylium, f.
Daucus Carota, c.
Hedera Helix, f.
[Sambucus nigra, f.]
Lonicera Periclymenum, f.
Galium verum, f.
saxatile, c.
palustre, f.
Aparine, c.
Valeriana sambucifolia, f.
Scabiosa Succisa, c.
Eupatorium cannabinum, 2.
- Solidago Virgaurea, f.*
Bellis perennis, f.
Aster Tripolium, f.
Filago germanica, 1.
Antennaria dioica, 1.
Gnaphalium uliginosum, c.
sylvaticum, 2.
Pulicaria dysenterica, 1.
Bidens tripartita, 1.
Achillæa Millefolium, f.
Ptarmica, f.
Chrysanthemum segetum, 1.
Leucanthemum, r.
Matricaria inodora, c.
** discoidea, l.*
Artemisia vulgaris, f.
Tussilago Farfara, f.
Senecio vulgaris, c.
sylvaticus, r.
Jacobæa, f.
aquaticus, f.
Arctium Newbouldii, 1.
Cnicus lanceolatus, c.
palustris, c.
pratensis, c.
arvensis, f.
Saussurea alpina, 1.
Centaurea nigra, f.
Lapsana communis, f.
Crepis virens, 1.
Hieracium Pilosella, f.
anglicum, 1.
hypochaeroides, 1.
Hypochaeris radicata, c.
Leontodon hirtus, 2.
autumnalis, c.
Taraxacum officinale, f.
Sonchus oleraceus, f.
asper, f.
arvensis, 2.
Jasione montana, f.
Campanula rotundifolia, 1.
Vaccinium Myrtillus, f.

<i>Calluna vulgaris</i> , <i>c.</i>	<i>Teucrium Scorodonia</i> , <i>f.</i>	<i>Narthecium ossifragum</i> , <i>f.</i>
<i>Erica Tetralix</i> , <i>c.</i>	<i>Ajuga reptans</i> , <i>i.</i>	
<i>cinerea</i> , <i>c.</i>	<i>Plantago major</i> , <i>i.</i>	<i>Juncus bufonius</i> , <i>c.</i>
<i>Armeria maritima</i> , <i>c.</i>	<i>lanceolata</i> , <i>c.</i>	<i>squarrosus</i> , <i>f.</i>
<i>Primula vulgaris</i> , <i>c.</i>	<i>maritima</i> , <i>c.</i>	<i>Gerardi</i> , <i>i.</i>
<i>Lysimachia nemorum</i> , <i>c.</i>	<i>Coronopus</i> , <i>c.</i>	<i>effusus</i> , <i>c.</i>
<i>Glaux maritima</i> , <i>2.</i>	<i>Littorella lacustris</i> , <i>3.</i>	<i>maritimus</i> , <i>i.</i>
<i>Anagallis arvensis</i> , <i>f.</i>	<i>Chenopodium album</i> , <i>i.</i>	<i>supinus</i> , <i>f.</i>
<i>tenella</i> , <i>v. c.</i>		<i>obtusiflorus</i> , <i>i.</i>
<i>Samolus Valerandi</i> , <i>f.</i>	<i>Beta maritima</i> , <i>f.</i>	<i>lamprocarpus</i> , <i>f.</i>
<i>Fraxinus excelsior</i> , <i>i.</i>	<i>Atriplex patula</i> , <i>f.</i>	<i>acutiflorus</i> , <i>f.</i>
<i>Erythræa Centaureum</i> , <i>f.</i>	<i>hastata</i> , <i>f.</i>	<i>Luzula maxima</i> , <i>3.</i>
<i>Menyanthes trifoliata</i> , <i>f.</i>	<i>Salsola Kali</i> , <i>i.</i>	<i>campestris</i> , <i>f.</i>
<i>Myosotis cæspitosa</i> , <i>c.</i>	<i>Polygonum Convulvulus</i> , <i>i.</i>	<i>erecta</i> , <i>f.</i>
<i>repens</i> , <i>c.</i>	<i>aviculare</i> , <i>f.</i>	<i>Sparganium ramosum</i> , <i>f.</i>
<i>arvensis</i> , <i>f.</i>	<i>Raii</i> , <i>i.</i>	<i>minimum</i> , <i>2.</i>
<i>versicolor</i> , <i>i.</i>	<i>Hydropiper</i> , <i>f.</i>	<i>Lemna minor</i> , <i>i.</i>
<i>Calystegia sepium</i> , <i>i.</i>	<i>Persicaria</i> , <i>f.</i>	<i>Alisma Plantago</i> , <i>i.</i>
<i>Scrophularia nodosa</i> , <i>i.</i>	<i>amphibium</i> , <i>i.</i>	<i>ranunculoides</i> , <i>i.</i>
<i>Digitalis purpurea</i> , <i>f.</i>	<i>Oxyria digyna</i> , <i>i.</i>	<i>Triglochin palustre</i> , <i>f.</i>
<i>Veronica agrestis</i> , <i>2.</i>	<i>Rumex obtusifolius</i> , <i>c.</i>	<i>maritimum</i> , <i>i.</i>
<i>polita</i> , <i>2.</i>	<i>crispus</i> , <i>c.</i>	<i>Potamogeton natans</i> , <i>3.</i>
<i>Tournefortii</i> , <i>i.</i>	<i>Acetosa</i> , <i>f.</i>	<i>polygonifolius</i> , <i>c.</i>
<i>arvensis</i> , <i>f.</i>	<i>Acetosella</i> , <i>c.</i>	<i>Eleocharis palustris</i> , <i>f.</i>
<i>serpyllifolia</i> , <i>f.</i>	<i>Euphorbia Helioscopia</i> , <i>f.</i>	<i>multicaulis</i> , <i>c.</i>
<i>Chamædrys</i> , <i>f.</i>	<i>Peplus</i> , <i>i.</i>	<i>Scirpus cæspitosus</i> , <i>r.</i>
<i>Beccabunga</i> , <i>f.</i>	<i>Urtica dioica</i> , <i>f.</i>	<i>fluitans</i> , <i>f.</i>
<i>Euphrasia officinalis</i> , <i>c.</i>	<i>urens</i> , <i>f.</i>	<i>Savii</i> , <i>2.</i>
<i>Bartsia Odontites</i> , <i>f.</i>	<i>Myrica Gale</i> , <i>f.</i>	<i>setaceus</i> , <i>2.</i>
<i>Pedicularis palustris</i> , <i>2.</i>	<i>Betula pubescens</i> , <i>3.</i>	<i>lacustris</i> , <i>2.</i>
<i>sylvatica</i> , <i>f.</i>	<i>Corylus Avellana</i> , <i>i.</i>	<i>maritimus</i> , <i>i.</i>
<i>Rhinanthus Cristagalli</i> , <i>c.</i>	<i>Quercus Robur</i> , <i>i.</i>	<i>Eriophorum vaginatum</i> , <i>2.</i>
<i>Utricularia minor</i> , <i>r.</i>	<i>Salix cinerea</i> , <i>f.</i>	<i>angustifolium</i> , <i>2.</i>
<i>intermedia</i> , <i>i.</i>	<i>aurita</i> , <i>f.</i>	<i>Rhynchospora alba</i> , <i>i.</i>
<i>Pinguicula vulgaris</i> , <i>f.</i>	<i>repens</i> , <i>c.</i>	<i>Schænus nigricans</i> , <i>f.</i>
<i>lusitanica</i> , <i>3.</i>	<i>[viminalis]</i> , <i>i.</i>	<i>Carex dioica</i> , <i>i.</i>
<i>Mentha hirsuta</i> , <i>f.</i>	<i>[Smithiana]</i> , <i>i.</i>	<i>pulicaris</i> , <i>r.</i>
<i>Thymus Serpyllum</i> , <i>c.</i>	<i>Empetrum nigrum</i> , <i>r.</i>	<i>arenaria</i> , <i>i.</i>
<i>Prunella vulgaris</i> , <i>c.</i>	<i>Listera cordata</i> , <i>i.</i>	<i>paniculata</i> , <i>3.</i>
<i>Stachys palustris</i> , <i>f.</i>	<i>Orchis mascula</i> , <i>2.</i>	<i>echinata</i> , <i>f.</i>
<i>arvensis</i> , <i>2.</i>	<i>incarnata</i> , <i>f.</i>	<i>ovalis</i> , <i>f.</i>
<i>Galeopsis Tetrahit</i> , <i>i.</i>	<i>maculata</i> , <i>c.</i>	<i>vulgaris</i> , <i>c.</i>
<i>Lamium intermedium</i> , <i>i.</i>	<i>Habenaria chloroleuca</i> , <i>3.</i>	<i>glaucæ</i> , <i>c.</i>
<i>purpureum</i> , <i>f.</i>	<i>Iris Pseud-acorus</i> , <i>f.</i>	<i>limosa</i> , <i>i.</i>
<i>hybridum</i> , <i>i.</i>	<i>Scilla nutans</i> , <i>2.</i>	<i>pilulifera</i> , <i>r.</i>
		<i>præcox</i> , <i>r.</i>

<i>Carex panicea</i> , <i>f.</i>	<i>Koeleria cristata</i> , <i>f.</i>	<i>Asplenium viride</i> , 1.
<i>sylvatica</i> , 1.	<i>Molinia cærulea</i> , <i>f.</i>	<i>Trichomanes</i> , 2.
<i>binervis</i> , <i>c.</i>	<i>Dactylis glomerata</i> , <i>f.</i>	<i>Athyrium Filix-fæmina</i> , <i>c.</i>
<i>distans</i> , <i>f.</i>	<i>Poa annua</i> , <i>f.</i>	<i>Scolopendrium vul-</i> <i>gare</i> , 3.
<i>Hornschuchiana</i> , 2.	<i>pratensis</i> , <i>f.</i>	<i>Aspidium aculeatum</i> , 1.
<i>extensa</i> , 1.	<i>trivialis</i> , <i>f.</i>	<i>angulare</i> , 1.
<i>flava</i> , <i>c.</i>	<i>Glyceria fluitans</i> , <i>c.</i>	<i>Iastrea Filix-mas</i> , <i>f.</i>
<i>ampullacea</i> , <i>f.</i>	<i>Festuca rottbœllioides</i> , 2.	<i>dilatata</i> , <i>f.</i>
<i>Phalaris arundinacea</i> , 1.	<i>sciuroides</i> , <i>f.</i>	<i>æmula</i> , <i>c.</i>
<i>Anthoxanthum odora-</i> <i>tum</i> , <i>f.</i>	<i>ovina</i> , <i>f.</i>	<i>Polypodium vulgare</i> , <i>f.</i>
<i>Alopecurus genicula-</i> <i>tus</i> , 1.	<i>rubra</i> , <i>f.</i>	<i>Osmunda regalis</i> , <i>c.</i>
<i>Agrostis alba</i> , 1.	<i>Bromus mollis</i> , 1.	<i>Ophioglossum, vulga-</i> <i>tum</i> , 3.
<i>vulgaris</i> , <i>c.</i>	‡ <i>commutatus</i> , <i>f.</i>	<i>Botrychium Lunaria</i> , 1.
<i>Aira caryophyllea</i> , <i>f.</i>	<i>Brachypodium sylvati-</i> <i>cum</i> , <i>f.</i>	<i>Equisetum maxi-</i> <i>mum</i> , <i>c.</i>
<i>præcox</i> , <i>c.</i>	[<i>Lolium perenne</i> , 1.]	<i>arvense</i> , <i>f.</i>
<i>Deschampsia cæspi-</i> <i>tosa</i> , 1.	<i>Agropyron repens</i> , 1.	<i>palustre</i> , 2.
<i>flexuosa</i> , 3.	<i>juncum</i> , 1.	<i>limosum</i> , <i>f.</i>
<i>Holcus lanatus</i> , 1.	<i>Nardus stricta</i> , <i>f.</i>	<i>Lycopodium Selago</i> , 2
<i>Arrhenatherum avena-</i> <i>ceum</i> , <i>f.</i>	<i>Hymenophyllum uni-</i> <i>laterale</i> , 1.	<i>Selaginella selagin-</i> <i>oides</i> , 3.
<i>Triodia decumbens</i> , <i>f.</i>	<i>Pteris Aquilina</i> , <i>c.</i>	<i>Chara fragilis</i> , <i>f.</i>
<i>Phragmites commu-</i> <i>nis</i> , 2.	<i>Blechnum Spicant</i> , <i>v.c.</i>	<i>Nitella translucens</i> , 1.
<i>Cynosurus cristatus</i> , <i>c.</i>	<i>Asplenium Adiantum-</i> <i>nigrum</i> , <i>f.</i>	<i>opaca</i> , 1
	<i>marinum</i> , <i>f.</i>	

NOTES ON THE LIST.—To the above list the following notes of varieties observed, and miscellaneous comments, may be added:—

Fumaria confusa, Jord.—Of one gathering Mr. Pugsley writes:—"A weak state." Of another; "This is a form which I have seen only from Ireland. It is probably only a variety of *F. confusa*, Jord., but differs from the type in the colouring, and I think in the shape of the corolla, in these features simulating *F. Borzi*, Jord. I hope to report fully on this plant after having seen it fresh."

Cardamine pratensis, L.—The form with proliferous leaves was noted.

Polygala vulgaris, L.—Only found on the great cliff, among alpsines—a handsome dwarf form, with very large leaves and flowers. Mr. Arthur Bennett writes of it:—"It is very like specimens I gathered on the cliffs of chalk at Dover, and when I gathered it I thought I had found *grandiflora* . . . It certainly seems to me to come at least half way between that and the *eu-vulgaris* of Syme, and is a notable form."

Spergula arvensis, L.—Both forms (*vulgaris* and *sativa*) common.

Montia fontana, L.—Var. **minor** common; var. **rivularis** only once seen.

Alchemilla vulgaris, L.—Rare on the island. **A. alpestris** Schm. was the prevailing form, but **A. pratensis** Schm. also occurred.

Rubus.—Only a limited amount of attention was given to the Brambles. **R. pilicatus** and **R. rusticanus** were frequent. Of some half dozen selected specimens gathered and submitted to Mr. Rogers, the fact that two of them prove to be **R. pulcherrimus** and three **R. idaeus** may be taken as showing that these two forms, the latter of which appears to be endemic in Ireland, are also frequent. Another interesting gathering was unfortunately mixed; Mr. Rogers writes:—"Stem piece looks like *R. Selmeri*, while panicle strongly recalls the *R. Lettii* of Cos. Down and Armagh, and may belong to that."

Saxifraga decipiens, Ehrh.—The Clare Island plant is a very hairy, strong-growing tufted form. Mr. Bennett writes that he places it under *S. decipiens* Ehrh.=*S. hirta* Smith non Haworth, and that in his opinion it is too strong a form to go to *sponhemica*, as I had suggested. The segregate *S. decipiens* is hitherto in Ireland recorded from Kerry only.

Myriophyllum alterniflorum, DC.—Only in mountain rivulets at the western extremity of the island.

Oenanthe crocata, L.—Common, but generally with both leaves and flowers utterly destroyed by some insect pest, we could not determine what.

Bellis perennis, L.—Abundant only in ground formerly cultivated.

Matricaria discoidea, DC.—This alien was the first plant to greet us on our arrival at Westport. It never left us on our 12-mile drive along the southern shore of Clew Bay, and saw us off at Roanah Quay. At Clare Island Quay it welcomed us an hour later, and when we again reached the mainland at Achill Sound it was waiting for us. On Clare Island it has spread for about $\frac{1}{2}$ mile along the several roads leading from the Quay.

Arctium Newbouldii, Ar. Benn. (*A. nemorosum* Bab. non Lej.) Burdocks were quite immature at the time of our visit, but by the kindness of Mr. McCabe of Clare Island I received in September an enormous plant in fruit, which I despatched to Mr. Bennett. He writes regarding it:—"The specimens are *A. nemorosum* Bab. non Lejeune=*A. Newbouldii* mihi. Some years ago my friend Beeby got Lejeune's type sent to him, and he had it photographed. It was a poor specimen, but still we thought it sufficient to say that Newbould and Babington's *nemorosum*! is not it. The *English Botany* figure of *A. nemorosum* (Syme *E.B.* 3 ed., t. 701) is merely *A. intermedium* Lange! Lange, Beeby and I had a lot of correspondence, exchange of specimens, &c., in this genus. Lange (*Hand. Dansk. Fl.*, ed. 4, p. 357) identifies *A. nemorosum* Lejeune *Fl. Spa.*, 1813, with his *Lappa (Arctium) intermedia* 1843, and I believe he is right. Lange remarked of specimens sent to him of "*A. nemorosum* Bab., not of Lejeune?" "I

do not know this; you should compare and work this up; probably confined to Britain." And so far as I can at present find, Babington's plant is unknown on the Continent. . . .

A. majus is well distinguished.

A. minus has the *small* heads and exsertal flowers.

A. intermedium has the heads in size between *majus* and *minus* (but very variable), and *stalked*—stalks often very long.

A. Newbouldii has the heads agglomerated (and almost sessile) at the apex of the *principal stems*, at times the side branches show more or less stalked heads."

The only Irish records I know for *A. Newbouldii* are that of R. A. Phillips from Macroom in *Irish Top. Bot.*, and an unpublished one of my own from Co. Dublin. Further information concerning this plant in Ireland is certainly desirable.

Cnicus pratensis, L.—The young flowering shoots often attacked by a fungus which causes them to end in a hard round scaly bud like that of an *Inula*, which eventually bursts and discharges a quantity of brown spores.

[**Carduus nutans**, L.—"On Clare Island; Hon. Miss E. Lawless" (*Cyb. Hib.*, ed. ii.) This is one of the very few previous plant-records from the island. Miss Lawless informs me that she gathered plants on Clare Island during her brief visit there at the request of A. G. More, and sent the specimens to him. Reference to Mr. More's annotated copy of *Cybele*, ed. i., in the Royal Irish Academy, shows the above entry in his own hand-writing, so it may be taken that he named the specimen. Miss Lawless cannot say where she gathered the plant. We watched for it continually, but did not find it.]

Hieracium hypochæroides, Gibs., var. **saxorum**, F.J.H.—On the Croaghmore cliffs at about 1,100 feet. A rare Hawkweed, endemic in the British Isles. In Ireland known only from Clare and Cork hitherto, the Cork plant being also var. *saxorum*, which would appear to be the calcifuge variety of a calcicole species. To judge from the wide separation of the stations of this Hawkweed, better known as *H. Gibsoni* (Yorkshire, Cork, Mayo, Clare), it would appear to be an instance of relict, not initial, endemism (see Drude: *Handbuch der Pflanzengeographie*, p. 125, 1890; and Shull: *Geographic Distribution of Isoetes saccharata*, *Bot. Gazette*, xxxvi., 195, 1903).

H. anglicum, Fr.—Abundant on a sea-cliff east of the Light-house.

Leontodon autumnalis, L. var. **simplex** Duby.—Mr. Bennett so names a peculiar very small glabrous dandelion, with almost entire leaves and unbranched flower-stems, found among sea-rocks in several places, and already in full flower in early July.

Anagallis tenella, L.—Perhaps the commonest plant on the island, growing everywhere, from the driest pasture to the wettest marsh.

Euphrasia officinalis, L.—Forms which I took to be **E. brevilpila**, Burn. and Grem., and **E. gracilis**, Fr., were common—an observation confirmed by Mr. Townsend, who finds three gatherings of each of these among the specimens submitted to him. **E. occidentalis**

Wettst. and *E. curta* Fr. var. *glabrescens* Wettst., also occurred ; and a fifth form is doubtfully referred to *E. scottica* Wettst. Of the above *E. occidentalis* has not been previously noticed in the western half of Ireland, and *E. gracilis* and *E. curta* are new to Mayo. The Eyebright flora of Clare Island is evidently rich, and would repay study.

[*Pinus sylvestris*, L.—Plentiful stumps of Scotch Fir, some of them of large size, attest the presence of considerable woods on the island in past times.]

Luzula erecta, Desv.—The forms *umbellata* and *congesta* both frequent.

Agrostis vulgaris, L., var. *pumila* (L.)—Not infrequent.

Glyceria fluitans, R.Br.—Frequently infested by the fungus *Ustilago longissima*, Sow.

Equisetum limosum, L., var. *fluviatile*.—Frequent.

Osmunda regalis, L.—A huge tussock of a remarkable crested form was found by a stream near Ballytoohy. The stipe was often ramose ; the fronds multifid at the apex, the pinnæ the same ; the pinnules multifid, and provided with conspicuous basal lobes, especially on the posterior side, giving the pinnæ almost a cruciate appearance. These lobes were themselves often multifid. The subjoined sketch of the lower half of a pinna shows the character (fig. 3).



Fig. 3.—*Osmunda regalis*, variety.
Part of one pinna, $\frac{1}{3}$ nat. size.

Chara fragilis, Desv.—The type in two stations ; var. *barbata* in Lough Avullin ; forms approaching var. *barbata* in three stations ; the pretty little var. *delicatula* growing on the edges of peat-holes near the old Signal Tower.

ANALYTICAL NOTES.—Of some 360 species which are known to grow, or probably grow, in all the forty Irish botanical divisions, between 280 and 290 are present on Clare Island—in other words about 80 per cent. of the Clare Island flora is made up of “Universal” plants. The same comparison within the flora of the whole of West Mayo would give 60 per

cent. of universal plants for that division ; or within the Irish flora approximately 30 per cent. In Connacian type plants Clare Island is remarkably poor—a feature which it shares with Inishbofin, as will be seen later. Of 63 Connacian species listed in my paper on 'Types of Distribution', only three (*Saxifraga umbrosa*, *Oxyria*, and *Asplenium viride*) occur on the island. The absence (as on Inishbofin) of all the Connemara Heaths is noticeable. As to the other types, the only Ultonian plant is *Saxifraga oppositifolia* ; the only Mumonian, *Hieracium hypochaeroides* ; Lagenian type is not represented. Of Marginal plants, 16 out of 46 are present ; of Central plants, only one (*Juncus obtusiflorus*) out of 38.

One would expect the flora of Clare Island to be thoroughly calcifuge, and such is found to be the case. Taking the *Cybele* standard, we find that of 56 species classed as calcicole, only 7, or 12 per cent., occur. These are 5 "calcicole B" plants (namely *Anthyllis Vulneraria*, *Tussilago Farfara*, ?*Carduus nutans*, *Leontodon hirtus*, *Carex glauca*) and two "calcicole C" plants (*Antennaria dioica* and *Pulicaria dysenterica*). On the other hand, of 75 species classed as calcifuge, 58, or over 76 per cent., are found on the island.

COMPARISON WITH INISHBOFIN.—An interesting comparison may be made between the flora of Clare Island and that of Inishbofin and its satellite Inishark, as worked out by More and Barrington.² Inishbofin lies 16 miles south-west of Clare Island, and in respect of the mainland is very similarly situated. With Inishark, it has an area of nearly 5 square miles, against 6½ of Clare Island. The geological formation is the same. The surface differs in being devoid of any high ridge like Croaghmore, no point rising over 300 feet. Otherwise the physical features are very similar—a cliff-bound coast with a little sand, a great extent of undulating hilly moor, a few small lakes, a good deal of moist and boggy ground, and no trees. Mr. More's account makes one believe that Clare Island offers rather more shelter, as might be expected from its greater range of elevation ; Inishbofin, on the other hand, is much better supplied with lakes than Clare Island.

¹ *Proc. R. I. Academy*, xxiv., B., part 1, 1902.

² *Proc. R. I. Academy*, (2), ii. (Science), 1876.

As regards the floras of the two islands, they show a broad similarity, and a remarkable parallelism is noticeable sometimes in the case of plants absent, as well as plants present. For instance *Rumex conglomeratus* and *R. sanguineus* are absent, *R. obtusifolius* and *R. crispus* present in both floras—all plants which one expect to find everywhere; and a good many similar cases occur.

Coming to the total flora, the Clare Island list as given above numbers 368 species and sub-species, or, omitting *Characeæ* for the sake of comparison, 365. The flora of Inishbofin, according to the same standard¹, numbers 303. A comparison shows that 251 of these are common to both islands; 52 are found on Bofin and not on Clare, 117 on Clare and not on Bofin. The "index of floral diversity," according to Mr. Colgan's definition² would therefore be $\frac{169}{420}$ or .44. This figure may be compared with the corresponding indexes of several pairs of Irish botanical divisions by reference to Mr. Colgan's paper. It shows a higher degree of diversity than might have been expected in the flora of two adjoining areas so similarly situated. While a detailed comparison of the two floras would take up too much space, a few of the leading dissimilarities may be mentioned. The number of the representatives of a few orders is curiously out of proportion to the respective total floras. Thus, Clare has seven *Rosaceæ* (ranking *Rubus fruticosus* as one) not in Bofin, Bofin only two not in Clare. Bofin, on the other hand, is distinctly richer in *Ranunculaceæ* and *Cruciferae*. Clare has no less than thirteen *Compositæ* not in Bofin; Bofin only two not in Clare. Clare is also disproportionately rich in *Amentiferae* and *Orchidaceæ*. The most marked difference occurs among the *Cyperaceæ*. Mr. More considered that Bofin had its fair share of this order; yet Clare contains no less than thirteen species, including eight edges, not in Bofin, and possesses every Bofin species also. Against this, however, Bofin is unexpectedly rich in grasses, having

¹ Treating *Juncus conglomeratus* and *J. effusus* as separate species, and omitting *Festuca duriuscula* as a variety.

² *Irish Nat.*, x, 236. The index of floral diversity is "the ratio which the total of species not common to both areas bears to the total flora of the two areas combined."

eight species not in Clare, against four in Clare not in Bofin. In Vascular Cryptogams Clare is far ahead of Bofin, having twelve peculiar plants against two, eight of the twelve being ferns.

The rarest Bofin plants not in Clare are *Helianthemum guttatum*, *Calamagrostis Epigejos*, *Eriocaulon septangulare*, and *Isoetes echinospora*. As regards the first of these, it may possibly occur on Clare Island. Our visit took place shortly after the break-up of very unusual drought. The vegetation of dry spots had got utterly parched, and its remains were now covered with a fresh growth of late plants; so that small plants of dry places ran much risk of being missed.

Of the plants found on Clare Island, thirteen are additions to the flora of Division 27, West Mayo :—

Cochlearia danica.	Beta maritima.
8 Silene acaulis.	8 Atriplex hastata.
8 Saxifraga decipiens.	Polygonum Raii. ¹
8 Arctium Newbouldii.	Agropyron repens.
8 Hieracium hypochæroides.	Aspidium aculeatum.
8 Lamium hybridum.	Ophioglossum vulgatum.
	Equisetum maximum. ¹

Of these, the six marked “8” are additions to the flora of District viii. of *Cybele Hibernica*.

The following additional species had only one previous record from West Mayo :—

Fumaria confusa.	Leontodon hirtus.
Sagina maritima.	Stachys arvensis.
Spergularia rupestris.	Festuca rottbœllioides.
Rubus plicatus.	Bromus commutatus.
Crithmum maritimum.	Asplenium marinum.
Filago germanica.	Nitella translucens.

My best thanks are due to Messrs. Arthur Bennett, H. and J. Groves, E. F. Linton, W. G. Pugsley, W. Moyle Rogers, and Frederick Townsend, for their kindness in naming critical plants.

¹ Since the above was written these two plants have been recorded from West Mayo by myself (*supra*, p. 269) from the mainland near Clare Island.

OBSERVATIONS ON THE WEIGHTS OF BIRDS' EGGS.

BY NEVIN H. FOSTER, M.B.O.U.

IN the *Irish Naturalist* (vol. xi., pp. 237-245), I gave measurements and weights of the eggs of fifty-six species of birds, and during the past season have been able to secure particulars of thirteen other species, of which I now give results.

As in my previous article, each set weighed was taken from one nest, and in those cases where the eggs had undergone a perceptible period of incubation, it is so stated; those unmarked being fresh specimens.

LONG-TAILED TIT (*Acredula caulata*).

Inch. Inch. Grains.
 '53 × '43 — 12½ ($\frac{3}{4}$ hatched).

The Yew tree in which this beautiful nest had been built was cut down, and in its fall all the eggs were broken except the one.

TREE CREEPER (*Certhia familiaris*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.		
'65	×	'45 —	17½	'63	×	'48 —	18½
'63	×	'47 —	17½	'62	×	'48 —	18½
'62	×	'49 —	19	'63	×	'48 —	18

HOUSE MARTIN (*Chelidon urbana*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.		
'77	×	'55 —	31½	'75	×	'55 —	30½
'75	×	'55 —	31	'76	×	'54 —	30

GOLDFINCH (*Carduelis elegans*).

Carlow clutch.			King's Co. clutch.				
Inch.	Inch.	Grains.	Inch.	Inch.	Grains.		
'67	×	'51 —	23½	'7	×	'51 —	23
'62	×	'53 —	23	'72	×	'48 —	21
'64	×	'5 —	22	'72	×	'48 —	21½
'66	×	'49 —	21½	'72	×	'49 —	21

CANARY (*Serinus canaria*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.		
'72	×	'53 —	23	'72	×	'54 —	27
'74	×	'54 —	23½	'69	×	'52 —	24
'7	×	'54 —	26½				

LINNET (*Linota cannabina*).

(a) clutch.			(b) clutch ($\frac{3}{4}$ hatched).		
Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'68	× '54	— 26	'75	× '53	— 25 $\frac{1}{2}$
'7	× '53	— 26	'75	× '53	— 26
'67	× '53	— 25 $\frac{1}{2}$	'75	× '54	— 24 $\frac{1}{2}$
'67	× '52	— 24	'75	× '54	— 24 $\frac{1}{2}$
			'74	× '54	— 24 $\frac{1}{2}$

TWITE (*Linota flavirostris*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'68	× '52	-- 22 $\frac{1}{2}$	'66	× '52	— 22
'68	× '52	— 22 $\frac{1}{2}$	'68	× '53	— 24

CORN BUNTING (*Emberiza miliaria*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'9	× '63	— 45	'91	× '67	— 51
'9	× '63	— 45	'93	× '65	— 49 $\frac{1}{2}$

KINGFISHER (*Alcedo ispida*).

($\frac{3}{4}$ hatched).					
Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'88	× '7	— 52 $\frac{1}{2}$	'9	× '69	— 53 $\frac{1}{2}$
'88	× '7	— 53	'88	× '7	— 53
'89	× '71	— 53 $\frac{1}{2}$			

HERON (*Ardea cinerea*).

Inch.	Inch.	Grains.
2'1	× 1'7	— 771 $\frac{1}{2}$
2'25	× 1'67	— 781
2'2	× 1'66	— 754

MUTE SWAN (*Cygnus olor*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
4'17	× 2'87	— 4935 $\frac{1}{2}$	4'24	× 2'85	— 4742
4'27	× 2'87	— 4949	4'17	× 2'76	— 4383
4'27	× 2'91	— 4856	4'2	× 2'84	— 4812 $\frac{1}{2}$
4'26	× 2'87	— 4876			

WOODCOCK (*Scolopax rusticula*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'63	× 1'32	— 353	1'62	× 1'34	— 372
1'68	× 1'33	— 370	1'6	× 1'3	-- broken.

HERRING GULL, (*Larus argentatus*).

(a) clutch.			(b) clutch ($\frac{1}{2}$ hatched).		
Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
2.72	× 1.93	— 1311 $\frac{1}{2}$	2.85	× 1.82	— 1152 $\frac{1}{2}$
2.58	× 1.9	— 1271 $\frac{1}{2}$	2.9	× 1.78	— 1114 $\frac{1}{2}$

Hillsborough, Co. Down.

REVIEW.

A NEW MOSS BOOK.

Mosses with hand-lens and microscope, a non-technical handbook of the more common Mosses of the North-eastern United States. By A. J. GROUT, Ph.D. 4to. Pp. 86, 10 plates. Brooklyn. Part I., June, 1903. Price \$ 1.00.

Dr. Grout published a few years ago a useful little work, "Mosses with a hand-lens," as a help to a knowledge of the common Mosses. The present work is an extension and improvement of the former.

It is essential for a practical knowledge of these plants, especially in the field, that the hand-lens should be constantly used, and the compound microscope resorted to only when the former method fails.

Rare and critical species are not included, but only some 200 of the commoner ones, most of which grow in this country. It should, therefore, prove almost as useful here as in America.

The illustration is the strong point of Dr. Grout's work. Descriptions of things unfamiliar sometimes do not convey much. The plates and other illustrations in the text, copied from the "Bryologia Europæa" and Sullivant's "Icones" for American species, with due acknowledgment, are really beautiful, and cannot fail to be a great help to the student. The large size of the plates enables the whole plant, not only a small portion, as is so often the case, to be exhibited.

In Part I. directions are given for the collection, mounting, and microscopic examination of Mosses. There is also a chapter on Life-history and Structure, rather technical we fear for the beginner; for example, the discussion of the origin of the peristome, but instructive to those who have made some progress. There is also an illustrated glossary. The main body of the work is taken up with an account of the general and leading characters of all the commoner species. Each family and the larger genera at least are beautifully illustrated.

A distinct want is here supplied. It was difficult for beginners to make a commencement with only the help of one of the present manuals. As an introduction to Dixon's "Handbook" or Braithwaite's "Moss Flora" it will be invaluable.

C. H. WADDELL.

Saintfield.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Patas Monkey from Lieut. W. M. Corsellis, a Black-backed Gull from Mr. J. A. Martin, an Oyster-catcher from Mr. F. H. Walker, four Chaffinches, a Kestrel, four Redpolls and two Wagtails from Messrs. Williams, a pair of Hares from Messrs. E. and D. Carton, two Paradoxures from Mr. A. Accrington, two Cockateels from Mr. S. A. E. Goodbody, a Black-backed Jackal and two Royal Pythons from the Hon. P. B. Smyly. Two Llamas have been born in the Gardens. The young Giraffes and the baby Elephant are in excellent health, and give much pleasure to visitors.

CONCHOLOGICAL SOCIETY OF GT. BRITAIN AND IRELAND.

For the first time in its history, the Conchological Society has met on Irish soil. The Annual Meeting took place on September 19, in the rooms of the Royal Irish Academy, kindly lent for the purpose. This is a Society with a very scattered membership, and its supporters are mostly busy men, scattered throughout the length and breadth of England, Wales, Scotland, and Ireland. Hence it is not to be wondered at that the Dublin meeting was a small one. As a matter of fact, the Secretary, Dr. Hoyle, of Manchester Museum, alone represented the British members; but there was a good muster of Irish conchologists. In the afternoon, the President of the Society (Dr. Scharff) and Mrs. Scharff entertained the party at the Zoological Gardens, where a very enjoyable time was spent. In the evening the formal meeting took place, the President in the Chair. The Annual Report was read, officers for the ensuing year elected by ballot, and several new members elected and others proposed for membership. The remainder of the evening was occupied by short papers and exhibits. The PRESIDENT showed a very fine series of land mollusca from the Atlantic Islands, and another very valuable set from the Palæarctic Region in general, both sets being from the National Museum. R. WELCH showed a beautifully prepared series of rare Irish mollusca, illustrated by distributional maps. A. R. NICHOLS, M.A., exhibited rare marine mollusca from the deep waters off the West Coast of Ireland—this set being also from the national collection. R. LL. PRAEGER had on view a set of fossil shells from the Belfast Estuarine Clays, and drew attention to their great size and splendid state of preservation. P. H. GRIERSON showed a large series of land mollusca from Co. Kilkenny, which included some very rare species. J. de W. HINCH contributed glacial mollusca from the Dublin Mountains, and H. L. ORR, who was unable to be present, sent a series of boxes illustrating different methods of mounting mollusca. Dr. CHASTER sent over some very rare and interesting Irish land mollusca recently collected by himself. The proceedings concluded with a vote of thanks to the Royal Irish Academy for granting the use of their rooms.

NOTES.

ZOOLOGY.

The Pine-bud Moth.

Much damage has been done to young Scotch Pines about here during the last few years by the Pine-bud Moth. The leader is usually attacked, and when it has attained a length of four or five inches it suddenly droops and dies. On examination the larva will be found feeding on the shoot. The larva enter the chrysalis stage early in July, and the perfect insect emerges towards the end of the month.

There are, I believe, two species of moths to which the above name is given, but some I have lately succeeded in hatching out have been kindly identified by Mr. G. H. Carpenter as *Retinia buoliana*. The only previous record of this moth in Ireland is Mr. C. W. Watts' from Belfast. This moth is sometimes called the "Larch Tortrix," but it confines its unwelcome attentions here entirely to the Scotch Pine. I have never seen it on a Larch.

DENIS R. PACK-BERESFORD.

Fenagh House, Bagnalstown.

Involuntary Capture of a Swallow.

The following is a cutting from the *Waterford Standard*, May 16, 1903:—

"A STRANGE OCCURRENCE.

"Mr. Frank Davis Goff, of Rockmount, Kilmacthomas, had, on Monday last a new, if not an absolutely unique experience while fishing on the Tay, a stream that runs from the Comeragh Mountains. While walking along the bank, with his rod in an upright position, and the casting line flying in the breeze, he felt a weight somewhat like that of a trout, and on looking up to ascertain the cause, he was amazed to see a swallow dangling from the tail-fly, the bird doubtless mistaking the artificial fly for the natural one. He at once reeled in the line, and gently taking off the bird, let it off, and it flew away apparently none the worse for its mistake. Can any of our readers relate a similar incident?"

I cannot find in any of the text-books that I have on British Birds, or in the pages of the *Zoologist* for the last twenty-five years, any account of a similar capture, though I have often thought that such an occurrence was quite possible. Mr. E. F. Bisshop relates (*Zool.* 1886, p. 417) that while fishing once for Tench, three Swallows perched on his rod at one time, but this was apparently while it was fastened into the ground and stationary. The capture of a Swallow by an artificial fly must be very unusual. It seems strange that a bird with such a sharp eye could be deceived.

WILLIAM W. FLEMING.

Coolfin, Portlaw, Co. Waterford.

The Aquatic Warbler, a New Irish Bird.

The following letter was received on September 24th from the Bull Rock Lighthouse, Co. Cork.

"SIR,—Enclosed you will find a small bird which struck lantern on 20th inst., wind east, hazy. Yours,

JOSEPH HIGGINBOTHAM, Lightkeeper.

I was away from home when the specimen arrived, but my wife, on referring to the text-books, correctly identified the bird as an Aquatic Warbler, *Acrocephalus aquaticus*, and sent it to Mr. Williams for preservation. On dissection it proved to be an immature male. This is an addition to the Irish avifauna. Three instances of its occurrence in England are recorded in Saunders' *Manual*, p. 87, and it is not a little curious to observe that all three were mistaken for Sedge Warblers at first, or, at any rate, were not recognised as Aquatic Warblers for some years. The buff stripe along the centre of the head, with a darker stripe at either side, which is separated again by a brighter stripe from the eye, sufficiently distinguished this bird from its nearest ally, the Sedge Warbler. What a number of Irish ornithological rarities have been recorded from the rocky islets off our south-west coast! All of them were obtained by lighthouse keepers. The Yellow-browed Warbler, Lesser White-throat, Lapland Bunting, Aquatic Warbler, and Greenland Redpoll, were new to Ireland—while the Redbreasted Flycatcher, Pied Flycatcher, and Golden Oriole are of very rare occurrence.

RICHARD M. BARRINGTON.

Fassaroe, Bray.

White Wagtail at Balbriggan, Co. Dublin.

I saw a male White Wagtail, *Motacilla alba*, on Saturday, 4th September, at the Delvin River, two miles from Balbriggan. Its broad white forehead and grey back first attracted my notice, as it flew about from stone to stone, in the bed of this little river, which is the boundary between the counties of Dublin and Meath. It then flew up on the telegraph wires over the railway viaduct, when I had a good opportunity of noting the diamond-shaped black mark on the throat and breast, and the very long tail. The picture in Morris' "British Birds" very aptly represents the bird as I saw it at the Delvin. I had never seen one in Ireland before, and but once in England, near Clifton suspension bridge.

Mr. Ussher, in his "Birds of Ireland," has some interesting records of the occurrence of this bird, and Mr. R. M. Barrington, in his "Migration of Birds," notices its occurrence at the Blackwater Bank, and Codling Lightships; he also received a fine specimen in 1900 from Inuistrahull.

CHARLES W. BENSON.

Bedford House, Balbriggan.



THE REV. MAXWELL H. CLOSE, M.A.,
1867, *at* 45.

MAXWELL HENRY CLOSE, M.A.

ONE of the most familiar figures, one of the keenest thinkers, and one of the gentlest and yet most stimulating personalities, has passed from among the ranks of Irish men of science. At the age of eighty-one, the Revd. Maxwell H. Close died on September 12th, 1903, in the rooms long occupied by him in Lower Baggot Street, Dublin. For some years it had seemed to many of us that he moved in an area limited by those rooms, the house of the Royal Dublin Society, the Royal Irish Academy in Dawson Street, and the Church of the Magdalen Asylum in Lower Leeson Street. But within that area his activity, exercised in the quietest manner, was unceasing. Absolutely unconscious of himself, his mind seemed always filled with a consciousness of the wants of others. He subscribed towards the publication of literary or scientific works, with the object of encouraging research, and of giving some direct token of his goodwill to their authors; if the book, however, proved when issued to be of permanent value, he usually presented it to some library, where it would be more widely known than if he had kept it to himself. The library of the Royal Irish Academy was frequently enriched by gifts of this kind; and almost the last work of his life was the arranging of two series of drawings of Irish antiquities, which he then had bound at his own expense for presentation.

The list of his private benefactions will never become known. In making any unusually large donation to a charity, he preferred to remain anonymous, lest he should wound the feelings of some friend, to whose favourite scheme he had given less. But the best remembered feature of the help thus afforded by him will be his personal interest in those to whom he gave. This regard for others extended to the doings of the youngest scientific worker in the country; and it may be said that he gave away the results of many observations which other men would have published over their own names.

Maxwell Henry Close, the eldest son of the late Mr. H. S. Close, was born in Merrion Square East, Dublin, in 1822. Part of his schooldays were spent at Weymouth, where his head-

master predicted for him a brilliant career. His early taste for mathematical reasoning remained with him throughout life. He graduated, with the degree of B.A., at Trinity College (University of Dublin) in 1846, and was ordained in 1848. From 1849 to 1857 he was rector of Shington, in the south of Leicestershire; and it was characteristic of him that he felt increasing doubts as to the propriety of retaining an office obtained by him under the system of lay-patronage. He finally resigned his rectorship on conscientious grounds, and became curate at Waltham-on-the-Wolds, a village on the Jurassic scarp between Melton Mowbray and Grantham. He held this post until 1861, and soon after, on the death of his father, settled permanently in Dublin, giving his services to various churches in the city. He received the degree of Master of Arts from his University in 1867, and was elected a member of the Royal Irish Academy on May 13th of the same year. By this time his position as a geological observer had become established by three papers on the traces of the glacial epoch in Ireland; these were the result of work in the field, and of journeys which led him into many remote portions of the country. It is probable that his love of the ancient language and antiquities of Ireland became strengthened and confirmed during these researches, which brought him frequently into contact with the peasant populations of the west.

In his great paper on the general glaciation of Ireland (1866-7), Mr. Close showed that the land-ice of glacial times flowed "outwards from off the present land on every side of Ireland," and he accounted for the greater importance of the streams that moved south-east by suggesting that the west of the country and the plateau extending into the Atlantic stood formerly at a greater height than now. The gathering of an ice-field in the region between Lough Foyle and Lough Allen, from which the glaciation of northern Ireland radiated, is one of the most striking features shown on the map issued with his paper.

In 1872, Mr. Close published, with Mr. G. H. Kinahan, a pamphlet on the general glaciation of *Iar-Connaught*, pointing out the existence of a central area of dispersion in the Joyces' Country. This paper formed another and a practically unassailable contribution to the land-ice theory, as accounting

for glacial phenomena in Ireland ; and stress was again laid on the independence of the surface-form of the ice-massif and that of the underlying country, which it practically buried during its slow accumulation.

A paper still better known to British geologists is that on the high-level shell-bearing gravels deposited on the mountain-slopes near Dublin, which appeared in 1874. Mr. Close concluded in favour of the deposition of these gravels by the agency of floating ice. Whether that view is finally accepted or no, the paper will always be of value from the emphasis laid upon the drifted character of the shells, as distinct from those found in raised beaches. "The contained marine shells have been brought along with the gravel. Therefore the animals to which the shells belonged lived and died somewhere else, towards the north-west."

In 1878 and 1879, Mr. Close was President of the Royal Geological Society of Ireland, in which body he took an active interest until 1888, when its work became gradually merged in that of the Royal Dublin Society and the Royal Irish Academy. In his first presidential address, he adduced physical reasons for believing that the earth's age was far greater than that assigned to it by Sir William Thomson ; and in this matter he has been amply supported by the progress of both geological and physical opinion. His second address contained an important retrospect of the work of Sir Richard John Griffith, in which the successive issues of the first geological map of Ireland are admirably reviewed.

On November 30th, 1878, Mr. Close was elected Treasurer of the Royal Irish Academy, a post which he filled, with the most conscientious regard for all its details, until his resignation on March 16th, 1903. It may be safely stated that his increasing deafness in later years alone debarred him from occupying the Presidential chair of the Academy, for which his wide antiquarian and scientific knowledge fitted him in so remarkable a degree. He was also, for many years, a member of the science section of the Royal Dublin Society's Council.

Questions of mathematical physics always attracted him ; and, had he been less modest and considerate of others, he would have made a powerful controversialist. He was always willing to listen, ejaculating, "Ah—ah !" in a characteris-

tically thoughtful and enquiring manner, as the argument became unfolded by the speaker. Yet, all the time he might be concealing intellectual weapons, which could utterly demolish the position, if once they were called out into play. The present writer remembers how a somewhat verbose speaker, at a meeting of the Academy's Council, concluded his harangue by turning to Mr. Close, with the words, "And I am sure in all this the Treasurer heartily agrees with me."

"No," said Mr. Close; "I disagree entirely." And this was his sole contribution to the debate.

It was this disinclination to press his own opinions, firmly rooted as they always were, which led him to publish two works under assumed names. Through the kindness of Mrs. M. Close, who has also supplied the portrait reproduced in the present number, a copy of the second edition of the rare *Ausa Dynamica*, by "John O'Toole," lies before us. "Claudius Kennedy" published *A few chapters in Astronomy* in 1894, in which such questions as the tides, the moon's variation, and Foucault's pendulum, are discussed from an original standpoint, and in a manner that contrasts vividly with the looseness of expression, and the slurring over of difficulties, which characterise many of the elementary works regarded as "good enough for a student."

In 1897, Mr. Close contributed what proved to be his last geological paper, on granite boulders near Dublin, to the *Irish Naturalist*; and in the following year he wrote for the same journal the obituary notice of his old friend Samuel Haughton. Preparing quietly for his approaching end, he arranged in 1902 for the distribution of many of his books and papers. Towards Christmas in that year, he seemed somewhat stronger than of late, and he would speak almost petulantly of his inability to do as much as he could desire. In March, 1903, he laid his last accounts before the Council of the Royal Irish Academy, and withdrew from the desk in the Treasurer's office, where he had attended almost daily for so many years. He died on September 12th, having performed to the full the life-task that he had set before himself. No thought of personal ambition had ever stirred him. He regarded even the Royal Irish Academy, in which he might have won pre-eminence, as a kind of monastic order, in which he was one of

many helpers, working for the advancement of the whole. The outside world saw in him an unobtrusive philanthropist, on whom it was always fair to make demands; but, to those who knew him, he has left the memory of one whose heart was in the intellectual progress of his country, and who none the less served her devotedly in a life of retirement and self-denial.

SCIENTIFIC PUBLICATIONS OF MAXWELL H. CLOSE.

1. "On some striated surfaces in the granite near Dublin." (1863). *Journ. Geol. Soc. Dublin*, vol. x. (1864), p. 96. (Deals with the origin of slickensides).
2. "Notes on the general glaciation of the rocks in the neighbourhood of Dublin." (1864). *Journ. Roy. Geol. Soc. Ireland*, vol. i. (1867), p. 3.
3. "Notes on the general glaciation of Ireland." (1866). *Ibid.*, p. 207. *Geological Magazine*, 1867, p. 234.
4. "On some peculiarities in the phenomena of glaciation, as indicating the nature of the agent." (1866). *Journ. Roy. Geol. Soc. Ireland*, vol. i. (1867), p. 287. (A short paper, published in abstract, in favour of the land-ice theory.)
5. "Archdeacon Pratt on M. Delaunay's experiments on the internal fluidity of the earth." *Geol. Mag.*, 1870, p. 537.
6. "On some corries and their rock-basins in Kerry." (1870). *Journ. Roy. Geol. Soc. Ireland*, vol. ii. (1871), p. 236. (Deals with the glacial origin of cirques).
7. "The general glaciation of Iar-Connaught and its neighbourhood, in the counties of Galway and Mayo." By G. H. Kinahan and M. H. Close. 8vo. Dublin: Hodges, Foster & Co., 1872. (With a folding map).
8. "The elevated shell-bearing gravels near Dublin." *Geol. Mag.*, 1874. p. 193. *Journ. R. Geol. Soc. Ireland*, vol. iv. (1877), p. 36.
9. "The Geology of the County Cork." In Cusack's "History of the City and County of Cork," pp. 419-453, coloured map. 8vo. Dublin and Cork, 1875.
10. "Concerning the extent of geological time." *British Assoc. Report*, 1878, p. 548. *Geol. Mag.*, 1878, p. 450.
11. "The Physical Geology of the neighbourhood of Dublin." *Sci. Proc. R. Dublin Soc.*, vol. i. (1878), p. 133. *Journ. R. Geol. Soc. Ireland*, vol. v. (1880), p. 49. (Written in connexion with the visit of the British Association to Dublin. Includes a coloured geological map by Mr. R. G. Symes).
12. Anniversary Address to the Royal Geological Society of Ireland, Febr. 18, 1878. *Sci. Proc. R. Dublin Soc.*, vol. ii. (1880), p. 5. *Journ. R. Geol. Soc. Ireland*, vol. v. (1880), p. 1.
13. Ditto, Febr. 17, 1879. Same journals, vol. ii. (1880), p. 191, and vol. v. (1880), p. 132, respectively.

14. "On the definition of force as the cause of motion, with some of the inconveniences connected therewith." (1882.) *Sci. Proc. R. Dublin Soc.*, vol. iii. (1883), p. 336.

15. "On the meaning of 'Force.'" *Phil. Mag.*, 5th ser., vol. xv. (1883), p. 248.

16. "The Geology of the neighbourhood of Dublin as affecting its Sanitary Conditions." *Trans. Sanitary Inst. of Great Britain*, vol. vi. (1884). (Written for the meeting of the Institute in Dublin).

17. "Ausa dynamica: Force, Impulsion, and Energy." ("Darings in dynamics"). By John O'Toole. 8vo Dublin: Hodges, Figgis, & Co., 1884. 2nd edition, enlarged, 1886. (Includes an essay on the dynamics of the oar).

18. "Note on the Moon's variation and parallaxic inequality." *Proc. R. Irish Acad.*, 3rd ser., vol. ii. (1891), p. 65.

19. "A few chapters in Astronomy." By Claudius Kennedy, M.A. 8vo. London: Taylor and Francis, 1894.

20. "The former abundance of granite boulders in the S.E. neighbourhood of Dublin." *Irish Naturalist*, vol. vi. (1897), p. 29.

21. Obituary notice of Revd Samuel Haughton. *Ibid.*, vol. vii. (1898), p. I.

22. "Remarks on a cosmographical tractate in the Irish language in the library of the Royal Irish Academy." *Proc. R. Irish Acad.*, 3rd ser., vol. vi. (1901), p. 457. (An account, with characteristic touches of humour, of an Irish version, made about 1400 A.D., of an Arabic astronomical treatise).

23. "Hipparchus and the precession of the equinoxes." *Ibid.*, 3rd ser., vol. vi., p. 450. (Intended to prove finally that Hipparchus believed that the increase of the longitudes of the fixed stars was due to an eastward progression of the stars themselves, and not, as now held, to a westward retrogression of the equinoctial points).

G. A. J. COLE.

NEWS GLEANINGS.

Professor A. Francis Dixon.

It is with much satisfaction that we record the appointment of Dr. A. Francis Dixon to the Chair of Anatomy at Dublin University vacated by the transfer of Professor Cunningham to Edinburgh. Like his illustrious predecessor, Dr. Dixon adds to a thorough knowledge of human anatomy a keen interest in zoological science. His early work in Ireland on the anatomy of sea-anemones will always be remembered by naturalists, and we trust, now that he has returned to Dublin, he will find time to advance our knowledge of Irish natural history.

NOTES ON THE MOLLUSCA OF COUNTY KILKENNY.

BY P. H. GRIERSON.

I SEND some notes taken of the Mollusca of Co. Kilkenny during the first half of each of the years 1902-1903. I had no opportunity of exploiting the S.W. corner, near Piltown; or the S.E. side, between New Ross and Waterford town. The county is well drained by various rivers nearly all flowing in a southerly or south-easterly direction. There are practically no lakes; the only one of any size—Lough Cullen—which lies about five miles north of Waterford, I was unable to visit.

I am much indebted to Messrs. R. Welch and L. E. Adams, for help, the former for naming various *Hyalinæ* and *Pisidia*, the latter for naming slugs, &c.

In giving the following list I have followed Dr. Scharff's nomenclature as given in *Irish Naturalist*, 1892. I also give the numbers of the sheets, one inch Ordnance Survey map, where the specimens were taken, after the name of the nearest town. The county comprises portions of eight sheets, viz.:—136, 137, 146, 147, 156, 157, 167, 168.

***Vitrina pellucida*.**—This species is common, but not easy to find except in winter and early spring.

***Hyalinia cellaria*.**—These shells are common, a large number being var. *vitrina*. Var. *albina* at Gowran (147).

H. allaria.—Castlecomer (137); Kilkenny and Kilmanagh (146); Ullard (var. *viridula*) (147); Callan (var. *viridula*) (156); Inistioge (157); near Waterford (var. *viridula*) (168). Fairly well distributed.

H. nitidula.—N.E. of Attanagh (var. *Helmii*) (136); Freshford and Ballyragget (136); Kilkenny, Kilmanagh, S.W. of Freshford, Callan Road (146); Ruthstown, Gowran, Ullard (147); near Stoneyford and Callan (156); Inistioge (157); Silverspring and near Waterford (168). Common.

H. pura.—N.E. of Attanagh, Freshford, Ballyragget (136); Castlecomer (137); Callan Road (146); Kilkenny, Gowran, Powerstown, (var. *nitidosa*) (147); Callan (156); Thomastown (var. *nitidosa*) (157). Common.

H. radiatula.—Ballyragget, N.E. of Attanagh, Freshford (var. *viridescenti-alba*) (136); Clogh (137); 3 m. S.W. Freshford (var. *viridescenti-alba*) (146); Powerstown and N. of Graiguenamanagh (147); Callan (156); Inistioge (157); near Waterford (168). Common.

H. crystallina.—Johnstown, Freshford (136); Clogh (137); Kilmanagh (146); Kilkenny (147); Callan (156); Thomastown (157); Silverspring and near Waterford (168). Fairly common.

- H. fulva.**—N.E. of Attanagh (136); Clogh and Castlecomer (137); W. of Kilkenny (146); Gowran (147); Ballinvarry (157). Uncommon.
- H. nitida.**—Freshford and Ballyragget (136); near Kilkenny and Ullard (147); Graiguenamanagh (157). Not common.
- Arion ater.**—Well distributed.
- A. hortensis.**—Fairly common.
- A. circumscriptus.**—Common.
- Testacella Maugel.**—Two specimens were sent to me from Jenkinstown garden (136). Rare.
- Limax maximus.**—Jenkinstown (146); Thomastown (157); near Waterford (168). Not very common.
- L. marginatus.**—Ballyragget (136); Kilkenny (147); S.E. of Callan (156); Mullinavat (168). Not very common.
- Agriolimax agrestis.**—Very common. Var. *iliclna* at Jenkinstown (146).
- A. lævis.**—Near Waterford (168). Rare.
- Amalia sowerbyi.**—Kilkenny (147); Thomastown (157). Rather rare.
- A. gagates.**—Jenkinstown (146); Kilkenny (147); S.E. of Callan (156); Thomastown (157); near Waterford (168). Fairly common.
- Helix pygmæa.**—Near Attanagh (136); Castlecomer (137); Kilmanagh, Urlingford and Callan Road (146); Kilkenny and Gowran (147); Callan (156); Thomastown (157). Not uncommon.
- H. rotundata.**—Very common.
- H. rupestris.**—Attanagh, Johnstown, Connaghy (136); Kilkenny, Jenkinstown, and 3 m. S.W. of Freshford (146); Gowran (147); Callan (156); Thomastown (157); near Waterford (168). Rather common on limestone walls.
- H. pulchella.**—Freshford, Ballyragget (136); 3 m. S.W. Freshford (146); Kilkenny and Bennetsbridge (var. *costata*) (147); Gowran (147); Callan (156); Ballinvarry (157); near Waterford (var. *costata*) (168). Common; var. *costata* rather rare.
- H. aculeata.**—Attanagh (136); Castlecomer (137); Gowran and Kilkenny (147); Callan (156). Not uncommon, but rather difficult to find.
- H. lamellata.**—Thomastown (157). Common in a plantation there, but rare in the county.
- H. hispidula.**—Very common.
- H. rufescens.**—Attanagh, Johnstown, and Freshford (136); Clogh (137); Jenkinstown (146); Kilkenny and Gowran (147); Callan (156); Thomastown (157); near Waterford (168). Common near old buildings under stones.
- H. fusca.**—Castlecomer (137); Thomastown (157). Rare.
- H. virgata.**—Attanagh, Johnstown, Ballyragget (136); Clogh (137); Jenkinstown (146); Kilkenny and Goresbridge (147); Kells (156); Newmarket and Thomastown (157). Common.
- H. intersecta.**—Attanagh, Ballyragget (136); Clogh (137); N. of Callan (146); Goresbridge (147); S. of Callan (156); Thomastown and Newmarket (157); near Waterford and Silverspring (168). Common on the limestone formation.

- H. ericetorum.**—Attanagh, Ballyragget, Johnstown (136); Castlecomer (137); Jenkinstown and 3 m. S.W. of Freshford (146); Kells (156); Goresbridge (147); Thomastown (157); Mullinavat (168). Common on the limestone formation.
- H. acuta.**—N.E. of Attanagh (136); Kilkenny (147); Thomastown (157). Very local, but abundant where it occurs.
- H. nemoralis.**—Very common.
- H. hortensis.**—Near Kilkenny (146); on bank under hedge, several dead specimens. Rare.
- H. aspersa.**—Common all over the county.
- Bullminus obscurus.**—Callan Road (146); Attanagh (136); Kilkenny (147). Rather rare.
- Cochlicopa lubrica.**—Common.
- Cœcilianella acicula.**—Two miles S. of Ballyragget (136); 3 m. S.W. of Freshford, Ardalos Abbey (146); 1 m. S. of Kilkenny, in old quarry; $5\frac{1}{2}$ m. E. of Kilkenny, and $1\frac{1}{2}$ E. of Kilkenny (147); Callan (156); Thomastown (157). The above were found by turning over stones in dry limestone situations, and the shell was fairly common in these stations.
- Pupa angilca.**—Attanagh (136); Muckalee (137); 3 m. S.W. of Freshford (146); Gowran (147); Callan (156); Thomastown (157). Rather common in damp shaded situations.
- P. cyllindracea.**—Common.
- P. muscorum.**—Three Castles (146); Kilkenny (147); Callan (156). To be found under stones in dry limestone quarries. Not rare.
- Vertigo edentula.**—Lisdowney (136); Kilkenny (147); Callan (156); Thomastown, Inistioge, Ballinvarry, Graiguenamanagh (157). Rather common.
- V. pygmæa.**—Freshford, Connaghy (136); Clogh (137); 3 m. S.W. of Freshford (146); N. of Graiguenamanagh (147); Callan (156); Thomastown and Inistioge (157); Kilmacow (168). Rather common.
- V. substriata.**—Callan road (146); Kilfane (147). Rare.
- V. antivertigo.**—Freshford (136); Clogh (137); Jenkinstown (146); Kilkenny and Powerstown (147); Inistioge and Ballinvarry (157); near Waterford (168). Common in damp situations.
- V. angustior.**—I could not find this shell in the county, but took a number of specimens on east side of R. Barrow in Co. Carlow at Borris bridge.
- Balea perversa.**—Freshford (136); Castlecomer (137); Kilmanagh (146); Powerstown (147); Kells (156); Thomastown (157). Rather local.
- Clausilia bidentata.**—Common.
- Succinea putris.**—Freshford (136); N. of Graiguenamanagh (147); near Waterford (168). Not common.
- S. elegans.**—Freshford (136); Jenkinstown (146); Kells (156); Silver-spring and near Waterford (168). Not common.
- Carychium minimum.**—Lisdowney (136); Clogh (137); Urlingford and Jenkinstown (146); Kilkenny and Gowran (147); Thomastown

- Inistioge, Ballinvarry (157); Silverspring and near Waterford (168).
Common on roots of grass and among leaves in damp situations.
- Limnæa stagnalis.**—Urlingford and L. Macask (146). Rare, except in L. Macask, where it is very plentiful.
- L. peregra.**—Common everywhere.
- L. palustris.**—Ballyragget (136); Clogh (137); East and West of Kilkenny (146 and 147); Callan (156); Thomastown, Newmarket, Ballinvarry, Graiguenamanagh (157); near Waterford (168). Common.
- L. glabra.**—Recorded by Thompson from Kilmacow. I did not get it.
- L. truncatula.**—Common.
- Physa fontinalis.**—Attanagh (136); S. of Freshford (146); Kilkenny. Kilfane, (147); Callan (156); Silverspring and near Waterford (168); Not common.
- Aplexa hypnorum.**—Attanagh, Freshford (136); Clogh (137); 3 m. S. of Freshford (146); Kilkenny, Ruthertown, Goresbridge, Kilfane (147); Callan (156); Thomastown (157); Silverspring and near Waterford (168). Rather common.
- Planorbis marginatus.**—Common.
- P. carinatus.**—Urlingford (146); Ullard (147); Ballinvarry (157). Not common.
- P. spirorbis.**—Very common.
- P. contortus.**—Freshford (136); Muckalee (137); W. of Kilkenny (146); Kilkenny and Gowran (147); Thomastown (157); Silverspring (168). Not very common.
- P. albus.**—Gowran (147); Callan (156); Thomastown, Ballinvarry and Graiguenamanagh (157). Not common.
- P. glaber.**—Gowran (147). Rare; it is difficult to find, being so small.
- P. cristata.**—Gowran (147); 2 m. S. of Kells (156). Rare.
- P. fontanus.**—Kilbrahan (146); Kilkenny (147); 2 m. S.W. of Kells (156); Silverspring (168). Difficult to find, except in summer when feeding.
- Ancylus fluviatilis.**—Common locally.
- Acme ilneata.**—Muckalee (137); Graiguenamanagh (157). Rare.
- Bythinia tentaculata.**—Rather common.
- Hydrobia jenkinsi.**—Near Waterford (168). Common in brackish water.
- Valvata piscinalis.**—Attanagh, Freshford (136); S. of Freshford (146); Thomastown, Ballinvarry (157); Silverspring (168). Not common.
- V. cristata.**—Attanagh, Freshford (136); S. of Freshford (146); Kilkenny (147); Callan (156); Thomastown, Ballinvarry (157); Silverspring (168). Fairly common.
- Neritina fluviatilis.**—Ullard (147); Graiguenamanagh (var. *nigrescens*) (151). I found these only in R. Barrow.
- Sphærium corneum.**—Ballyragget (136); near Kilkenny (146 and 147); Callan, Kells (156); Thomastown, Graiguenamanagh (157); Silverspring (168). Rather common.
- S. lacustre.**—Near Waterford (168). Rare; I only took it in one place.

- Unio margaritifer.**—R. Barrow at Ullard (147). Said to be common in this river, but not easy to get except when the water is very low.
- Pisidium amnicum.**—Thomastown (157).
- P. pulchellum.**—Kilkenny (147).
- P. fontinale.**—Kilkenny, Ullard (147); Graiguenamanagh (157).
- P. millum.**—Kilkenny (146); Graiguenamanagh (157).
- P. obtusale.**—Kilkenny, Ullard (147).
- P. pusillum.**—Freshford (136); 3 m. S.W. Freshford (145); Kilkenny, Powerstown, Ullard (147); Graiguenamanagh (157); near Waterford (168)

HIERACIUM ORARIUM AND H. RIVALE IN IRELAND.

BY R. LLOYD PRÆGER.

AMONG some Hawkweeds kindly examined for me recently by Rev. E. F. Linton, are two interesting forms which are hitherto unrecorded from Ireland, and several others which are rare in this country. The plants in question were gathered by myself, at various times, and awaited naming by an authority.

- Hieracium flocculosum**, Backh.—Basalt cliffs, Kinbane, Co. Antrim, 19 July, 1891. Previously known in Ireland from one other locality in Antrim (Sallagh Braes), and one in Down (Mourne Mountains).
- H. Sommerfeltii**, Lindeb.—Hare's Gap, Mourne Mountains, Co. Down, August, 1889. Previously recorded from one station in West Donegal and one in Derry.
- H. rivale**, F.J.H., var. **subhirtum**, F.J.H.—Cliffs of Pigeon Rock Mountain at 1,400 feet, and of Eagle Mountain at 1,500 feet, 11 and 13 July, 1890. Both stations are in the Mourne Mountains. *H. rivale* is mainly a plant of N. and N.W. Scotland. The var. *subhirtum*, F.J.H., has its headquarters in Perthshire; Mr. E. F. Linton tells me it is suspected of being a named Scandinavian form.
- H. Orarium**, Lindeb., var. **fulvum**, F.J.H.—Stony shore of Lough Conn south of Derreen, W. Mayo, 27 July, 1900. This species, has a very scattered distribution in Britain, growing in the north of Scotland, Yorkshire, Derbyshire, and Wales.
- H. strictum**, Fr., var. **subcrocatum**, Linton.—Rocks on the edge of Lough Dan, Co. Wicklow, 29 July, 1893. *H. strictum* was recorded from Glenmalur in the same county by Isaac Carroil half a century ago (*Phytol.* v. 76, 1854)—its only station outside Donegal, Antrim, and Derry; so its rediscovery is welcome. The variety has not been recorded from Ireland before.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Golden Pheasant from Mr. W. S. Bagg, a pair of Barn-owls from Mr. F. Coppinger, two Linnets, two Larks, two Meadow Pipits, two Twites and two Redpolls from Messrs. Williams, eight Barbary Doves from Mr. J. Angus, a Kestrel from Mr. W. R. Green, two Himalayan Bears from Mr. C. W. Dunn, and a Baboon from Mr. P. J. Fox. A glass screen has been added to the Giraffe-house which enables visitors to see the animals while sheltering from the cold weather. The new arrangement of the Monkey-house now in progress will largely add to the comfort and convenience both of the inmates and their human visitors.

DUBLIN MICROSCOPICAL CLUB.

OCTOBER 17.—The Club met at Leinster House. MR. MOORE exhibited an inflorescence of the rare and curious Orchid, *Megaclinium triste*, from tropical Africa. The flowers are crowded together at the apex of a stout rachis some eighteen inches long, each flower enclosed in a bract. These bracts are closely imbricated, and of a bronzy-green colour, so that the unopened part of the inflorescence strikingly resembles the body of a lizard. The flowers are black, and the labellum is very delicately hinged, the slightest disturbance causing it to move up and down. Segments of the flower were also exhibited under the microscope.

MR. MCARDLE exhibited a Hepatic which he detected among specimens sent to him by Mr. Hunter of Belfast, who collected it on schist rocks at Rathmullan, County Donegal, in September last. No fruit, as yet, has been found. Considerable diversity of opinion exists among experts as to its name. Comparison with Norwegian and other specimens will be necessary to establish its identity. The branching and cell structure was shown under the microscope, and it is an interesting addition to the Irish cryptogamic flora.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 3.—The eighty-third Session opened, and the incoming President, Professor J. SYMINGTON, M.D., F.R.S., delivered an inaugural address on "John Grattan: an Appreciation of his Scientific Work." The President gave an interesting account of the pioneer work which John Grattan had accomplished in craniology, and exhibited and explained the actual machine which Grattan invented and made for the purpose of accurate measurement of skulls. Grattan's work was practically unknown owing to his papers having been chiefly published in an unsuitable journal, and also owing to his work being unfinished

at the time of his death. But Professor Symington intimated that he intended publishing a full account of Grattan's methods and machine in the proper scientific journals. Grattan belonged to that group of scientific investigators who had endeavoured to ascertain the physical characteristics of the pre-historic races of this country, and his researches and inventions were calculated to aid in the accurate determination of the differences between the various races of mankind, and the zoological position of man himself.

BELFAST NATURALISTS' FIELD CLUB.

OCTOBER 28.—ANNUAL CONVERSAZIONE.—The Exhibition Hall in Botanic Gardens Park was filled with the exhibits. Tea was served from 7 to 8 o'clock, and over 350 members and friends attended. At 8.30 the President, W. J. FENNELL, M.R.I.A.I., took the chair and delivered a short address. After welcoming the visitors, he congratulated the Club on the great success which had attended its summer excursions. He mentioned that the efforts of the Club to preserve Greyabbey have been successful, their recommendations receiving prompt attention from the owner. A member of the Club, Robert Bell, had added a new mineral, dopplerrite, to Ireland, and many members were taking an active part in the work of the sister organisation—the Ulster Fisheries and Biology Association. He reminded them that the Club was now taking another step in advance, and that they had secured the use of a room in the Museum, College Square. That room would be open every Wednesday evening from 7 to 9 o'clock, and he asked all who desired to aid the Club to meet there from week to week and exhibit interesting objects, raise discussions, or consult the Library.

Seven new members were elected. One of the Secretaries then read an Address to William Gray, M.R.I.A., on his retirement from the Committee after forty years continuous service. Mrs. Fennell presented Mr. Gray with a well-filled purse of sovereigns, and Mr. Gray feelingly replied. The address had been beautifully illuminated by John Vinycomb, M.R.I.A., Member.

A lantern exhibition of photographs, taken on the Club excursions, and a cinematograph display of microscopic animal and vegetable life, concluded this portion of the programme, and the inspection of exhibits continued. The following is a list of the exhibits:—

N. CARROTHERS—Collection of mounted Ferns and Flowering Plants. GEORGE DONALDSON—North American Ferns. NEVIN H. FOSTER—Varieties of the Lady Fern, *Athyrium Filix-femina*. P. F. GULBRANSEN—A new method of mounting Plants. W. H. PHILLIPS—Variations of British Ferns. R. L. L. PRAEGER, M.R.I.A.—Rare Plants from the Ards, including *Glyceria festucaeformis*, new to the British Flora; Rare Plants from Clare Island, Co. Mayo. REV. C. H. WADDELL, B.D.—Flowering Plants from the Isle of Man; Rare Mosses of Co. Down. F. J. BIGGER, M.R.I.A.—Land-shell pocket material from the Horn Head sand-dunes, containing many Vertigoes. JOHN COTTNEY—Birds' Eggs, and Nests.

REV. G. FOSTER—Irish Butterflies and Moths; Butterflies and Moths collected in Brittany last July. W. H. GALLWAY—Living Green Lizard, etc. W. A. GREEN—Mounted Birds, etc. REV. W. F. JOHNSON, F.E.S.—Rare Irish Beetles. D. E. LOWRY—A large Pike, mounted. H. LAMONT ORR—Nest of Bullfinch. JAMES ORR—Sea Urchins from Bundoran. ROBERT PATTERSON, M.R.I.A.—Nest of Goldfinch; Living Bat. GEORGE E. REILLY—Nest of Magpie. PROF. GREGG WILSON, D.SC., M.R.I.A.—Specimens illustrating adaptation to environment. W. H. WORKMAN, M.B.O.U.—Algerian Bird-skins. MISS M. K. ANDREWS—Microscopic Sections of Rocks near the junction of Granite and Silurian, Glen River, Newcastle, Co. Down. ROBERT BELL—Liassic Cephalopoda from Waterloo, Larne; the new Irish mineral Dopplerite, from the peat of Sluggan Bog. F. C. FORTH, A.R.C.Sc.I.—Geological Specimens and Models of Crystals. GEORGE C. GOUGH, A.R.C.Sc.—Sections of Fossil Plants, Crystals and Rocks; Shells of Gastropods cut to show interior; Fossils (fish, crabs, etc.), and minerals used as ornaments, and Precious Stones. Miss ANDREWS—Very fine flax thread spun at Comber at the end of the 18th century. W. & G. BAIRD, Ltd.—Photo-process Blocks in all stages of manufacture. F. J. BIGGER, M.R.I.A.—Irish Straw Crosses; Photographs of Donegal peasant life. C. M. CUNNINGHAM, L.D.S.—Exhibit of Electrotyping and Plating with home-made appliances. ROBERT DAY, M.R.I.A.—“Table book” with illuminated title, enclosing an autograph letter from Charlotte, Duchess of Richmond, to Earl O'Neill, July 12, 1586; Oliver Cromwell's Belt Pistol; Ancient Irish spirally twisted Silver Torc with loop and knot attachment, &c., &c. MRS. W. J. FENNELL—Model of the High Cross of Monasterboice; Model of the O'Kelly Seal found in Kilconnell Abbey. W. J. FENNELL, M.R.I.A.—Facsimiles of the famous Limavady Gold Ornaments, kindly lent by Edmond Johnson, Jeweller, Dublin. F. C. FORTH, A.R.C.Sc.I.—Sketches showing natural flowers and foliage applied to Art Decorative work. WILLIAM GRAY, M.R.I.A.—Photographs taken on the Summer Excursions. ROBERT MAY—A Bronze Lamp found in peat bog near Ballymoney. W. F. M'KINNEY—An Irish Quern; Gum from New Zealand. MRS. RIDDEL—Irish-made Toys from Ballycastle Toy Industry (Irish Models, Cottage Furniture, Farming Utensils, Carts, etc.). ADAM SPEERS, B.Sc.—Miscellaneous. J. VINYCOMB, M.R.I.A.—Heraldic Shields; Heraldic Seals; Bookplates; 19 Photographs of Addresses presented to Their Majesties in Belfast. R. WELCH—Photographs of the Sheephaven and Mulroy districts, N. Donegal.

DUBLIN NATURALISTS' FIELD CLUB.

SEPTEMBER 26.—EXCURSION TO OLDBAWN.—A party of sixteen took the 1.0 o'clock steam tram to Tallaght, whence they walked to Oldbawn Bridge, on the Dodder. Here Mr. Praeger, who conducted, briefly pointed out the features of the neighbourhood. The river has cut a broad terraced valley in the boulder-clay, and is now cutting sometimes through its own gravel terraces, sometimes through the solid drift. The

river terraces were explored from Old Bawn to Bohernabreena Bridge. A characteristic flora was noticed, including *Saponaria*, *Ononis arvensis*, *Poterium Sanguisorba*, *Parnassia*, *Erigeron acris*, *Carlina*, *Hieracium boreale*, *Gentiana Amarella*, *Chlora*, *Origanum*, *Euphorbia exigua*, *Bromus erectus*, *Equisetum variegatum*. The abundance of *Helix virgata* and *H. ericetorum* was very noticeable. A brown boulder-clay was seen in several spots apparently underlying the characteristic blue clay of the district, and calls for further investigation. The party returned to town by the 5.20 tram from Tallaght.

NOVEMBER 3.—The twentieth winter session of this Club was inaugurated by a *Conversazione* held in the rooms of the Royal Irish Academy and largely attended by members and visitors. Messrs. W. H. Phillips and Nevin H. Foster represented the Belfast Club, and Limerick was represented by Mr. F. Neale.

The Vice-President, F. W. BURBIDGE, M.A., F.L.S., occupied the chair and delivered an interesting address on the part played by observation in the study of Natural History, illustrating the subject by a series of very beautiful lantern slides chiefly of botanical scenery. The *Conversazione* broke up about 10.30 p.m. During the evening a number of scientific exhibits were displayed, including the following:—J. ADAMS, B.A.—Living specimens of local Seaweeds, and microscopical preparations of some of them. F. W. BURBIDGE, M.A., F.L.S.—Specimens of botanical interest from Trinity College Botanic Gardens. G. H. CARPENTER, B.Sc., and J. N. HALBERT—Insect cases from the exhibition collection of Irish Animals in the National Museum. G. H. CARPENTER, B.Sc., and D. R. PACK-BERESFORD—Nest inhabited by colony of *Vespa rufa* and *V. austriaca*, with series of both forms to show variation. [See *Irish Naturalist*. Sept., 1903.] J. A. CLARKE—Ciliary movement in epithelium of Frog's mouth. T. CROOK, A.R.C.Sc.I.—Various Crystal Types. WILLOUGHBY DADE—Microscopic specimens of Pond Life. J. DUFFY—Fossils from the Lower Carboniferous Limestone of Little Island, Co. Cork, St. Doulagh's and Cloghran, Co. Dublin. F. O'B. ELLISON, B.A.—Radium-bearing Pitchblende and other ores of rare metals. A. H. FOORD, Ph.D.—*Heliopora cerulea*, and one of its ancestors. MRS. W. S. GREEN—(1.) Nest of a South African Fuintye from the Transvaal; (2.) A roll of home-grown and home-rolled tobacco from the same district. W. F. GUNN—(1.) Sprays of Trees and Shrubs illustrating Autumn Tints, and sprays of Berried Shrubs; (2.) Hygrometric "seeds" of *Anthoxanthum odoratum* (Sweet Vernal grass); (3.) Spiral fibres from the epidermis of seeds of *Collomia coccinea*. MISS HENSMAN—A Dodder plant with three host-plants, Clover, Flax, and Grass. J. de W. HINCH—Fossil Mollusca from Co. Dublin Glacial Drift. PROF. T. JOHNSON, D.Sc.—A selection of dried plants, collected by students during a short summer course at the Royal College of Science. MISS M. C. KNOWLES and MISS O'BRIEN—New records for the Co. Limerick Flora. F. W. MOORE, M.R.I.A.—Small selection of interesting plants and flowers from the Royal Botanic Gardens, Glasnevin. D. MCARDLE—Selection of Rare Irish Mosses and Hepatics. MISS A. L.

MASSY—(1.) Cowries from the Andaman Islands ; (2.) Some Achill Mollusca. A. R. NICHOLS, M.A.—Some “ Pearl-Oysters ” and Pearl-bearing Mussels. R. LL. PRAEGER, B.A.—(1.) Rare Plants from Co. Down, including *Glyceria festucaeformis*, new to the British Flora ; (2.) Rare Plants from Clare Island, Co. Mayo. GEO. H. PETHYBRIDGE, PH.D., B.SC.—*Rhytisma Andromedæ*, a fungus new to the Counties Dublin and Wicklow. GEO. H. PETHYBRIDGE, PH.D., B.SC., and R. LL. PRAEGER, B.A.—Map of part of the Dublin Mountains showing the distribution of the vegetation. H. J. SEYMOUR, B.A., F.G.S.—Sedimentary Rocks from Co. Cork. R. J. USSHER, D.L.—(1.) Pennant's Globe Fish (*Tetrodon lagocephalus*) ; (2.) A Honey Buzzard from Co. Waterford ; (3.) A Head of a female Irish Elk from Co. Waterford. A. H. VARIAN—(1.) Moths and Butterflies caught during the year ; (2.) An appliance for showing small moths. R. P. VOWELL and R. M. BARRINGTON, LL.B.—Specimens of the Cloud-berry, *Rubus Chamemorus*, from Co. Tyrone. E. WILLIAMS—(1.) Abnormal varieties of Rook (*Corvus fugilegus*) ; (2.) A Chough (*Pyrrhocorax graculus*) from Achill Island ; (3.) Buff variety of Irish Hare (*Lepus variabilis*) from Donabate ; (4.) Common Tern (*Sterna fluvialis*) and nestlings.

Three new candidates were proposed for membership of the Club.

NOTES.

BOTANY.

Donegal Cryptogams.

To the *Journal of Botany* for November, Rev. H. W. Lett contributes a list of 115 mosses and 73 hepatics collected near Slieve League in 1902. *Scapania rosacea* is recorded as new to Ireland.

Rhinanthus segregates.

In recent papers on *Rhinanthus* in the *Journal of Botany*, by Rev. E. S. Marshall (October), and Mr. G. C. Druce (November), a few Irish records for some recent “ splits ” will be found.

Archangelica officinalis in Ireland.

By way of supplementing Mr. Praeger's note on this plant in *Irish Naturalist* for September (p. 245), I would mention that it has been cultivated by me in the garden here for many years ; it has also been cultivated for at least the last thirty years, and is still in the old garden of Seagoe Rectory, near Portadown ; and I have known it during the last fifty years in two gardens near Lisburn.

H. W. LETT.

Loughbrickland.

Rubus Chamæmorus again observed.

On September 6th we made a search for *Rubus Chamæmorus* in its only known Irish locality, where it was rediscovered on August 10th, 1892 (*Journ. Bot.*, 1892, p. 279, and *Irish Nat.*, 1892, p. 124). Although the exact locality, to within a few yards, was soon recognized, it was with no little difficulty that a few plants were found. The first thing to attract attention was a couple of leaves, withered and detached, lying on peat; subsequently others were seen here and there, and then a few green leaves half concealed among the stunted heather.

This most interesting Irish plant looks as if it were just struggling for existence, and that it has borne either flower or fruit for many years seems improbable. On this visit we made quite certain, from the six-inch ordnance map, that both localities given in the *Cybele Hibernica* (new edition) are considerably more than a mile from the nearest point of Londonderry, and that the species is entirely confined to Co. Tyrone. We cannot help thinking that a careful and minute search on the highest portions of the adjoining hills in Tyrone and Derry would prove that *Rubus Chamæmorus* is not confined to one mountain in Tyrone.

That the present locality is identical with the old record we have no doubt, and it is curious that both in 1826 and in 1892 it was erroneously believed that the locality where it grows was on the boundary line between Derry and Tyrone. There was no six inch map in 1826, and in 1892 it was unfortunately not referred to. Had it been, the plant would never have been recorded as occurring in Derry, though it is quite possible it may yet be found in that county by some keen-eyed botanist. The fragments collected on this occasion have been given to the Dublin Museum.

Dublin.

RICHARD P. VOWELL.

RICHARD M. BARRINGTON.

Lathyrus Aphaca at Stranmillis, Co. Antrim.

This plant has been observed at Stranmillis from 1864 to 1872, see *Flora N.E.I.*, p. 276. Last August I came across a few plants growing in a shady place in a field east of the Botanic Gardens Park, in the same neighbourhood. As this ground will shortly be utilised for building purposes, and is at present a play-ground for children, I am afraid this beautiful and curious *Lathyrus* will very soon cease to exist at this station.

Belfast.

N. CARROTHERS.

Glyceria festucaeformis.

In the *Journal of Botany* for November, Dr. A. B. Rendle describes and figures this Irish addition to the flora of the British Islands. The bulk of the paper consists of extracts from Mr. Praeger's paper in the October number of the *Irish Naturalist*.

ZOOLOGY.

Irish Copepod Crustaceans.

These Crustaceans are of such vast importance to our sea fisheries, since many of our food fishes depend on them for their daily rations, that any increase in our knowledge of these minute creatures helps us to solve some weighty fishery problems. To a large measure the amount of our country's income is dependent on the habits of the Copepoda, and no one need wonder, therefore, why Mr. Farran, at the instance of the Fishery Inspectors, has taken in hand the study of this difficult group of animals. "(Record of the Copepoda taken off Cleggan, Co. Galway: " *Report on Sea and Inland Fisheries of Ireland*, 1901, pt. 2.) Mr. Farran has observed about 40 species on the west coast, one of which, new to science (*Gatanus pileatus*), is described and figured.

Convolvulus Hawk-moth near Belfast.

I have had given me to-day (September 4) a live specimen of *Sphinx convolvuli* in fine condition, which was captured at Knock, Belfast. From its fresh appearance I should say it had not long emerged from its pupa case.

H. LAMONT ORR.

Belfast.

Convolvulus Hawk-moth at Londonderry.

On 8th September a specimen of *Sphinx convolvuli* was brought to me. It was picked up in the city by a lad. It is the first occurrence I know of in this district.

D. C. CAMPBELL.

Londonderry.

Lepidoptera taken near Limerick.

When at Limerick on the Dublin Field Club Excursion I had the opportunity of looking over a small collection of lepidoptera taken by the Rev. R. M'Clean in that neighbourhood, and among commoner species the following are worthy of note:—*Leucophasia sinapis*; *Epione advenaria*, not rare in Cratloe Wood; *Eurymene dolobraria*, several; *Pericallia syringaria*, three; *Seleina lunaria*, one at Cratloe Wood; *Acidalia candidata*, do.; *Bapta temerata*; *Panagra petraria*, numerous at Cratloe; *Lobophora halterata* and *L. virescens*, not rare at Cratloe; *Melanippe tristata* and *Eucosmia undulata*, Cratloe, a few. Of the above, *Epione advenaria* (already recorded by Mr. Carpenter, *I. Nat.*, vol. xi., p. 19) seems the most important discovery, only one other locality in Ireland being known, but the *Pericallia* and *Selenia* are most welcome additions to the hitherto known distribution.

W. FRAS. DE VISMES KANE.

Drumreask, Monaghan.

Some Irish Nudibranch Molluscs.

A list of the Nudibranchiate Molluscs of Ballynakill and Bofin Harbours, Co. Galway, is given by Mr. G. P. Farran in Part II. of the *Report on the Sea and Inland Fisheries of Ireland for 1901*. The variety of ground in Ballynakill Harbour evidently affords good collecting ground for Nudibranchs, as fifty-one species are enumerated in the list, and nearly all these species were found in this harbour. Mr. Farran suggests the name *Doris Beaumonti* for a new species of *Doris*, specimens of which were obtained at Ballynakill; it had already been met with by Mr. W. I. Beaumont at Port Erin and Valentia, but had not been described. The following six species:—*Lamellidoris depressa*, *L. sparsa*, *Cratena viridis*, *Galvina vittata*, *G. cingulata*, and *Calma glaucoides*, also have not been previously recorded from the Irish coast.

Additions to the Irish Fish fauna.

So very few papers on Fishes have been published in recent years, that we welcome Messrs. Holt and Byrne's articles on the British and Irish Gobies, on a young stage of the White Sole, and on the British and Irish *Stromateidæ*, with particular pleasure. We only fear that the *Report on the Sea and Inland Fisheries of Ireland for 1901*, in which these interesting papers have appeared, may not be as readily accessible to zoologists as they deserve.

Part II. of the Report, which contains the scientific investigations, appeals to the readers of the *Irish Naturalist* more especially. Besides the articles referred to, the problems of the propagation of Salmon and Trout are also dealt with, as well as the relationship between the size and sexual maturity of Pollan. There is, in fact, quite a wealth of useful information in the Report for the ichthyologist and fisherman.

As regards the first paper only four species of Irish Gobies were known when Dr. Scharff wrote his "Catalogue of Irish Fishes" in 1889. *Gobius Friesii* was added to the Irish fauna a few years later under the name of *G. macrolepis*.

Messrs. Holt and Calderwood added *G. Jeffreysii* in 1895 (*Trans. R. D. Soc.*, vol. v.). Two additional Irish species are now made known to us, viz., *G. pictus*, and another, *G. scorpioides*, less than an inch in length. Two beautifully coloured illustrations of the male and female of this rare species are given. No such excellent figures of Gobies as those now supplied have ever been published before.

Only one new Irish species is added in the list of Irish *Stromateidæ* above referred to, but it is a very remarkable and noteworthy addition. A specimen of American *Lerus perciformis* had been displayed in the National Museum under the name of *Centrolophus pompilus*; this Messrs. Holt and Byrne were able to identify after a careful scrutiny. It had been discovered by the late Fishery Inspector, William Andrews, in Dingle Bay in 1871, and named by him.

An instance of Deception on the part of a Thrush.

The bird referred to was observed to gather a large bunch of short grass from where it had been cut on the lawn in front of the house. Having done so it stood quite still for about half a minute, and then flew into a perfectly bare tree in the middle of lawn. Having gone through the form, apparently, of depositing a few blades of the grass in a fork of this tree it flew off into another leafless tree and went through the same show, evidently pretending to begin the building of its nest there.

After pausing a moment, and taking a sharp look round, it very quickly flew, and disappeared into a thick cypress, where presumably it was making its nest, and where its nest was afterwards found.

R. M. PATTERSON.

Strandtown, Co. Down.

Late stay of Swift.

Lord Antrim writes me that on October 8th he saw one Swift hawking strong with six House-Martins, at Glenarm, Co. Antrim—an unusually late date for the North of Ireland.

ROBERT PATTERSON.

Belfast.

Live Marten in Co. Wexford.

A pair of fine Martens (often known locally as "Marten Cats") frequented this place last spring (1903). One of them, a female, fell a victim to a rabbit-trapper. The other, as I am pleased to say, escaped so ignominious a death. This locality lies at some distance from any district regularly frequented by Martens, so that their occurrence here would seem to be an interesting instance of their tendency to wander.

G. E. H. BARRETT-HAMILTON.

Kilmanock, Arthurstown, Co. Wexford.

The Hairy-armed Bat.

This uncommon Bat (*Vesperugo Leisleri*) has been taken twice here within a fortnight. On August 19th one flew into a house at Whitehead Co. Antrim, in the early hours of the morning, and was brought to me the same day. It was a full-grown male. On September 1st, as Mr. John Cottney informs me, attention was drawn to sounds coming from a hole in a tree about 15 feet from the ground, at Hillsborough, Co. Down. On examination, three bats were found; one was a full-grown male, another was a smaller male, while the third was very small and apparently quite young. Unfortunately it was not preserved, but I saw the other two, and both are Hairy-armed Bats. It seems curious that two males should be found with such a very young one, which could hardly have survived a severe winter. It is 5 years and $2\frac{1}{2}$ years respectively since this bat has been recorded from Counties Antrim and Down.

ROBERT PATTERSON.

Belfast.



MBL/WHOI LIBRARY



WH 1AB8 -

